ER-430-459-578-US

Fig.-1

TRAFFIC COMPLEX

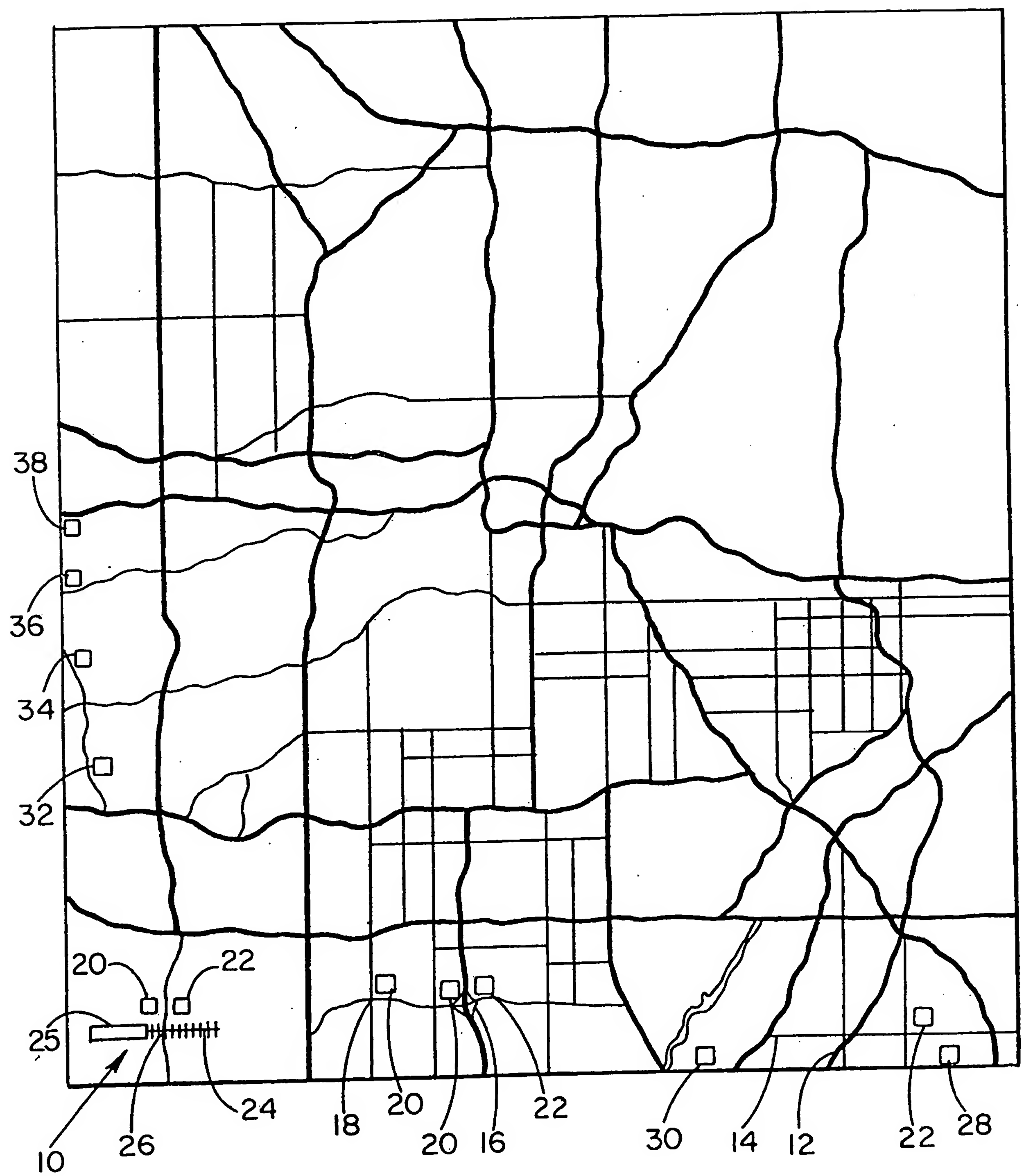


Fig.-2

COMMUNICATION IN TRAFFIC COMPLEX

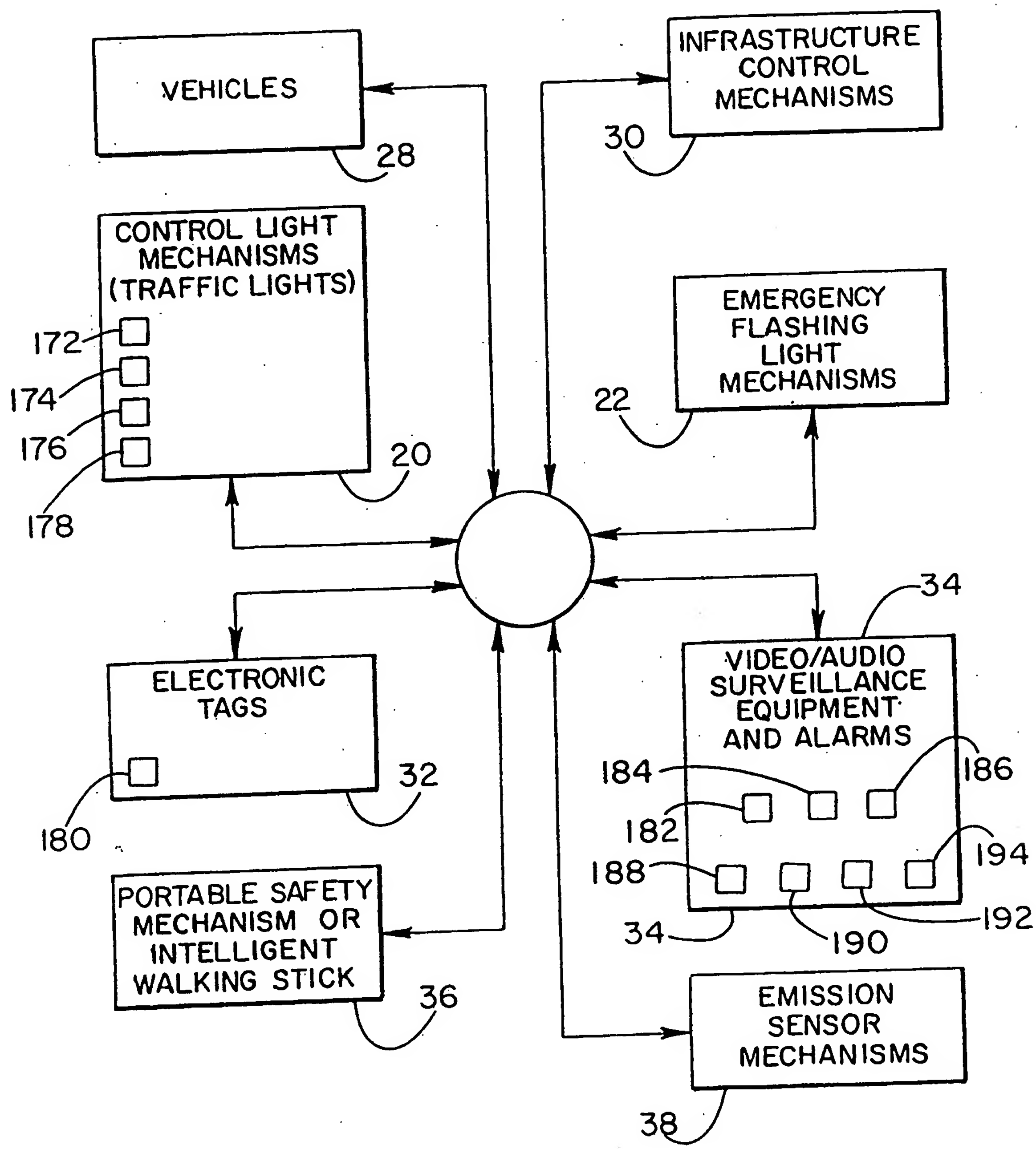


Fig.-3A

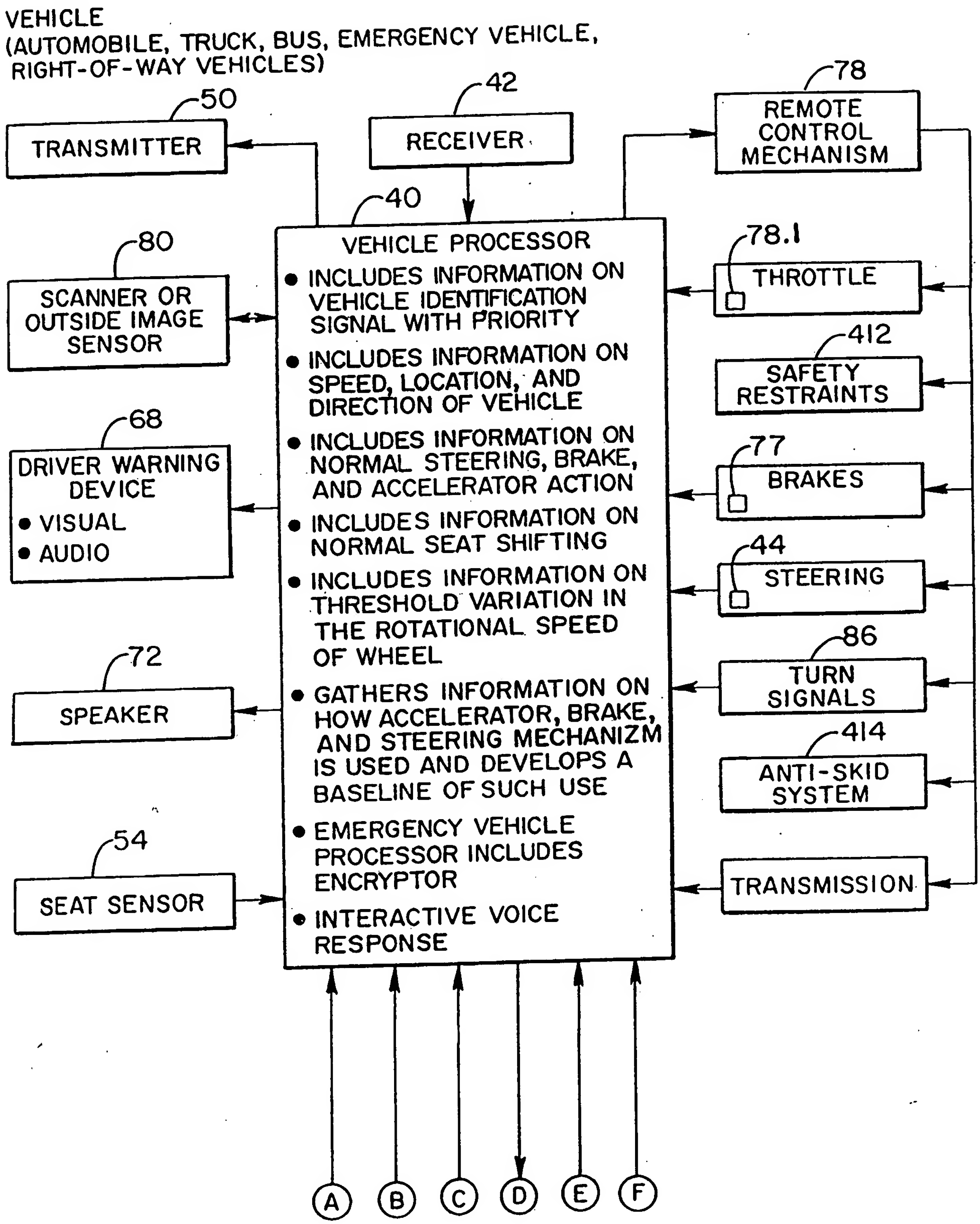

VEHICLE
(AUTOMOBILE, TRUCK, BUS, EMERGENCY VEHICLE, RIGHT-OF-WAY VEHICLES)
50
TRANSMITTER
42
RECEIVER
78
REMOTE CONTROL MECHANISM
40
VEHICLE PROCESSOR
• INCLUDES INFORMATION ON VEHICLE IDENTIFICATION SIGNAL WITH PRIORITY
• INCLUDES INFORMATION ON SPEED, LOCATION, AND DIRECTION OF VEHICLE
• INCLUDES INFORMATION ON NORMAL STEERING, BRAKE, AND ACCELERATOR ACTION
• INCLUDES INFORMATION ON NORMAL SEAT SHIFTING
• INCLUDES INFORMATION ON THRESHOLD VARIATION IN THE ROTATIONAL SPEED OF WHEEL
• GATHERS INFORMATION ON HOW ACCELERATOR, BRAKE, AND STEERING MECHANIZM IS USED AND DEVELOPS A BASELINE OF SUCH USE
• EMERGENCY VEHICLE PROCESSOR INCLUDES ENCRYPTOR
• INTERACTIVE VOICE RESPONSE
80
SCANNER OR OUTSIDE IMAGE SENSOR
68
DRIVER WARNING DEVICE
• VISUAL
• AUDIO
72
SPEAKER
54
SEAT SENSOR
78.1
THROTTLE
412
SAFETY RESTRAINTS
77
BRAKES
44
STEERING
86
TURN SIGNALS
414
ANTI-SKID SYSTEM
TRANSMISSION
A
B
C
D
E
F

Fig.-3B

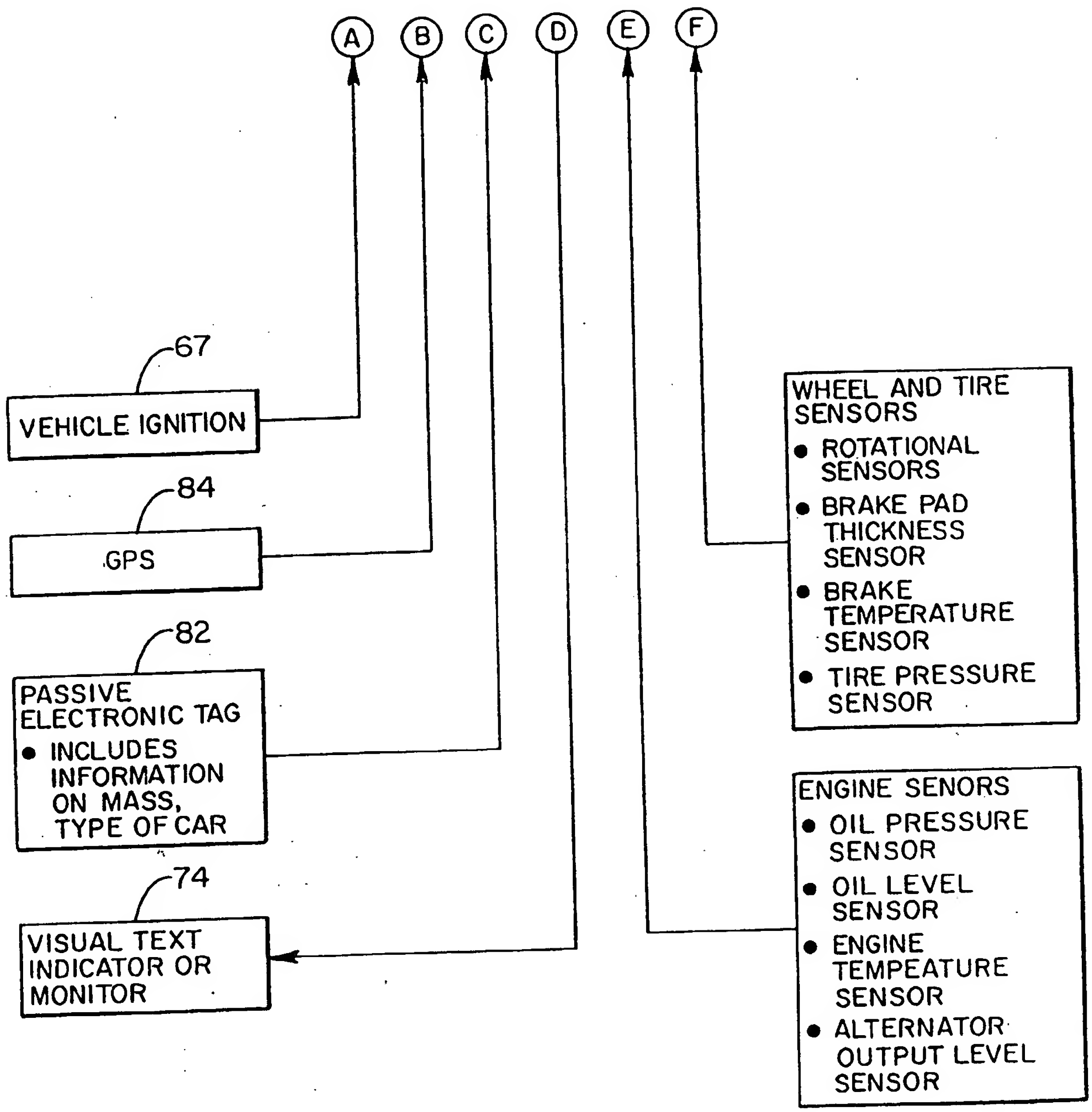
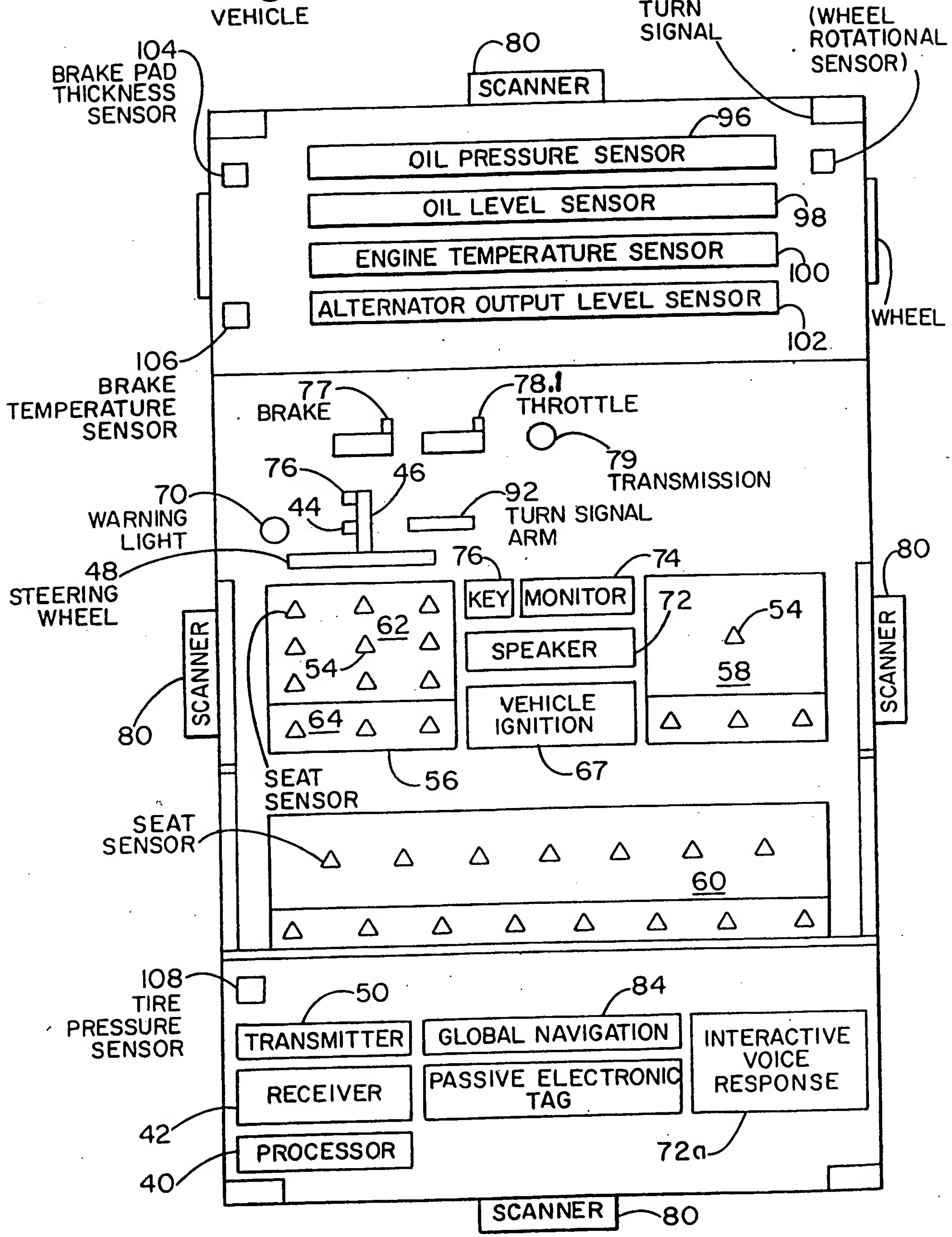

A
B
C
D
E
F
67
VEHICLE IGNITION
84
GPS
82
PASSIVE ELECTRONIC TAG
• INCLUDES INFORMATION ON MASS, TYPE OF CAR
74
VISUAL TEXT INDICATOR OR MONITOR
WHEEL AND TIRE SENSORS
• ROTATIONAL SENSORS
• BRAKE PAD THICKNESS SENSOR
• BRAKE TEMPERATURE SENSOR
• TIRE PRESSURE SENSOR
ENGINE SENORS
• OIL PRESSURE SENSOR
• OIL LEVEL SENSOR
• ENGINE TEMPEATURE SENSOR
• ALTERNATOR OUTPUT LEVEL SENSOR

Fig.-4



VEHICLE
104 BRAKE PAD THICKNESS SENSOR
80 SCANNER
94 TURN SIGNAL
66 (WHEEL ROTATIONAL SENSOR)
96 OIL PRESSURE SENSOR
OIL LEVEL SENSOR 98
ENGINE TEMPERATURE SENSOR 100
ALTERNATOR OUTPUT LEVEL SENSOR 102
WHEEL
106 BRAKE TEMPERATURE SENSOR
77 BRAKE
78.1 THROTTLE
79 TRANSMISSION
76
46
70 WARNING LIGHT
44
92 TURN SIGNAL ARM
48 STEERING WHEEL
76 KEY
74 MONITOR
80
72
54
62
54
58
SPEAKER
SCANNER
SCANNER
80
64
VEHICLE IGNITION
67
SEAT SENSOR
56
SEAT SENSOR
60
108 TIRE PRESSURE SENSOR
50 TRANSMITTER
84 GLOBAL NAVIGATION
INTERACTIVE VOICE RESPONSE
RECEIVER
PASSIVE ELECTRONIC TAG
42
PROCESSOR
72a
40
SCANNER 80

Fig.-5A

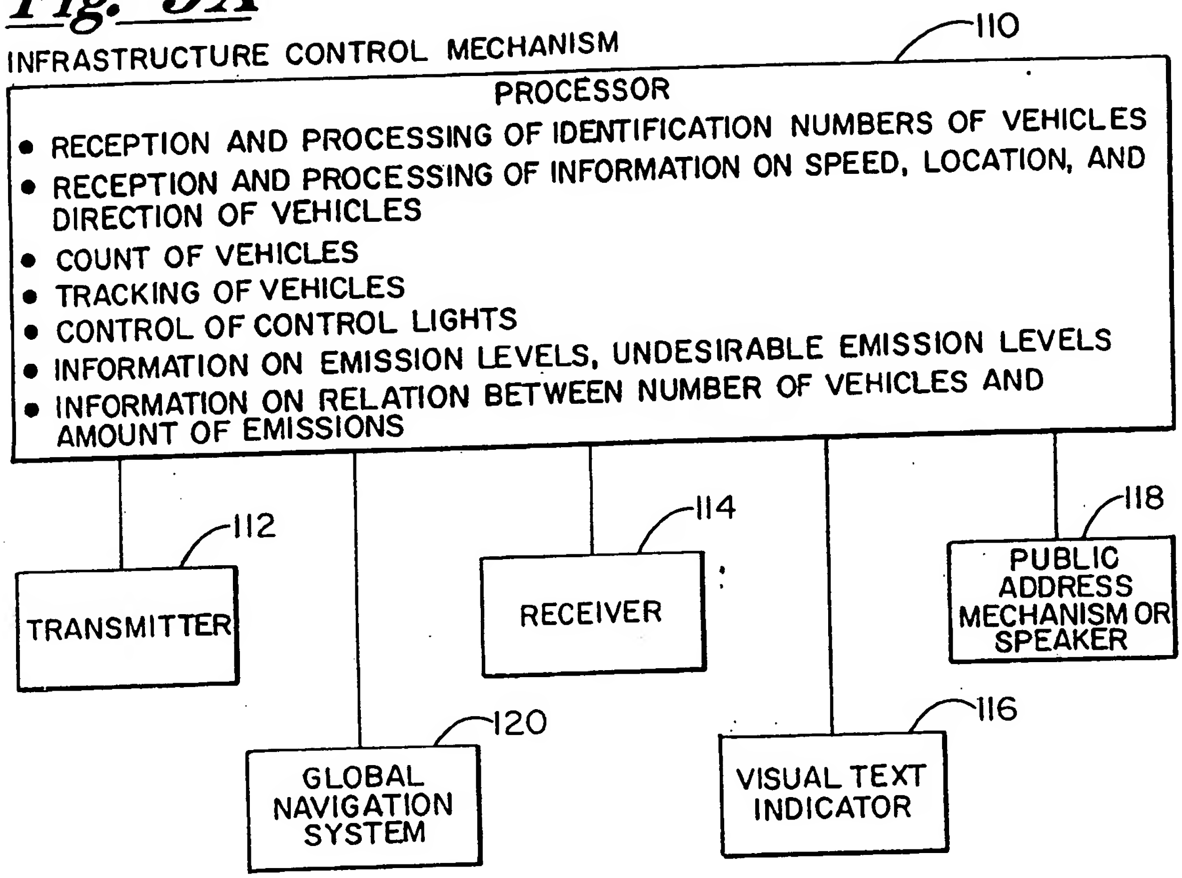

INFRASTRUCTURE CONTROL MECHANISM
110
PROCESSOR
• RECEPTION AND PROCESSING OF IDENTIFICATION NUMBERS OF VEHICLES
• RECEPTION AND PROCESSING OF INFORMATION ON SPEED, LOCATION, AND DIRECTION OF VEHICLES
• COUNT OF VEHICLES
• TRACKING OF VEHICLES
• CONTROL OF CONTROL LIGHTS
• INFORMATION ON EMISSION LEVELS, UNDESIRABLE EMISSION LEVELS
• INFORMATION ON RELATION BETWEEN NUMBER OF VEHICLES AND AMOUNT OF EMISSIONS
112
TRANSMITTER
114
RECEIVER
118
PUBLIC ADDRESS MECHANISM OR SPEAKER
120
GLOBAL NAVIGATION SYSTEM
116
VISUAL TEXT INDICATOR

Fig.-5B

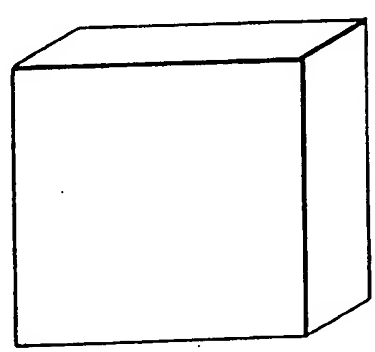


Fig.-6A

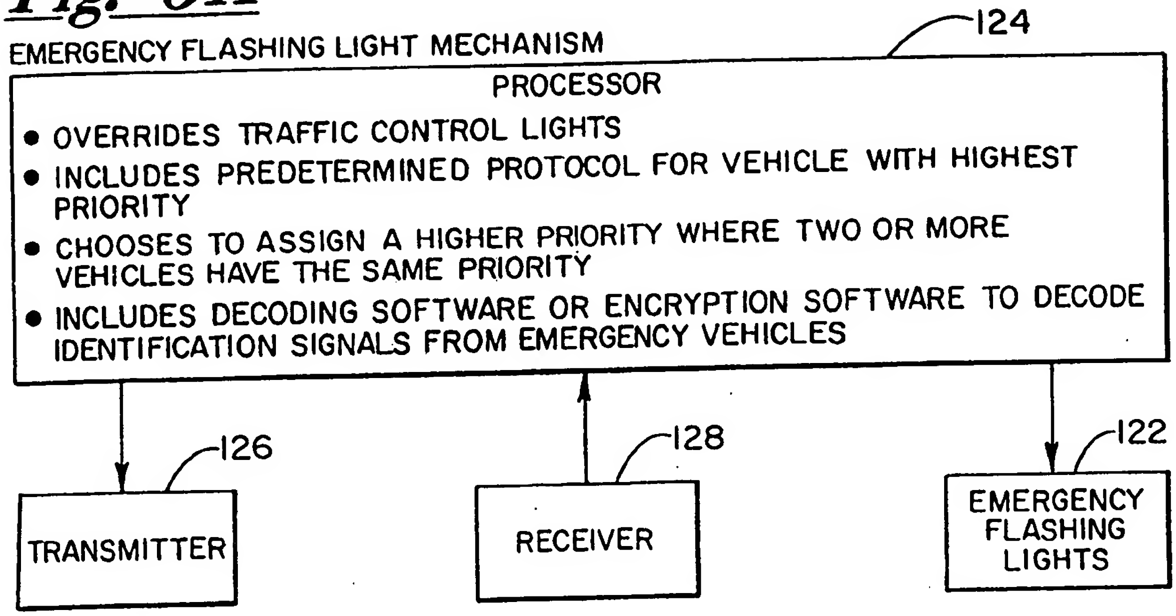

EMERGENCY FLASHING LIGHT MECHANISM
124
PROCESSOR
• OVERRIDES TRAFFIC CONTROL LIGHTS
• INCLUDES PREDETERMINED PROTOCOL FOR VEHICLE WITH HIGHEST PRIORITY
• CHOOSES TO ASSIGN A HIGHER PRIORITY WHERE TWO OR MORE VEHICLES HAVE THE SAME PRIORITY
• INCLUDES DECODING SOFTWARE OR ENCRYPTION SOFTWARE TO DECODE IDENTIFICATION SIGNALS FROM EMERGENCY VEHICLES
126
TRANSMITTER
128
RECEIVER
122
EMERGENCY FLASHING LIGHTS

Fig.-6B

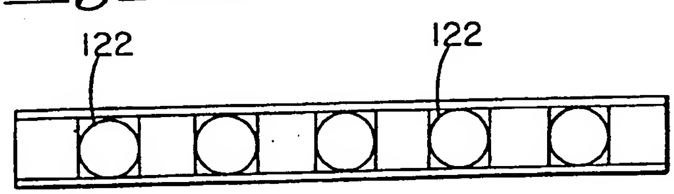

122
122

Fig.-7A

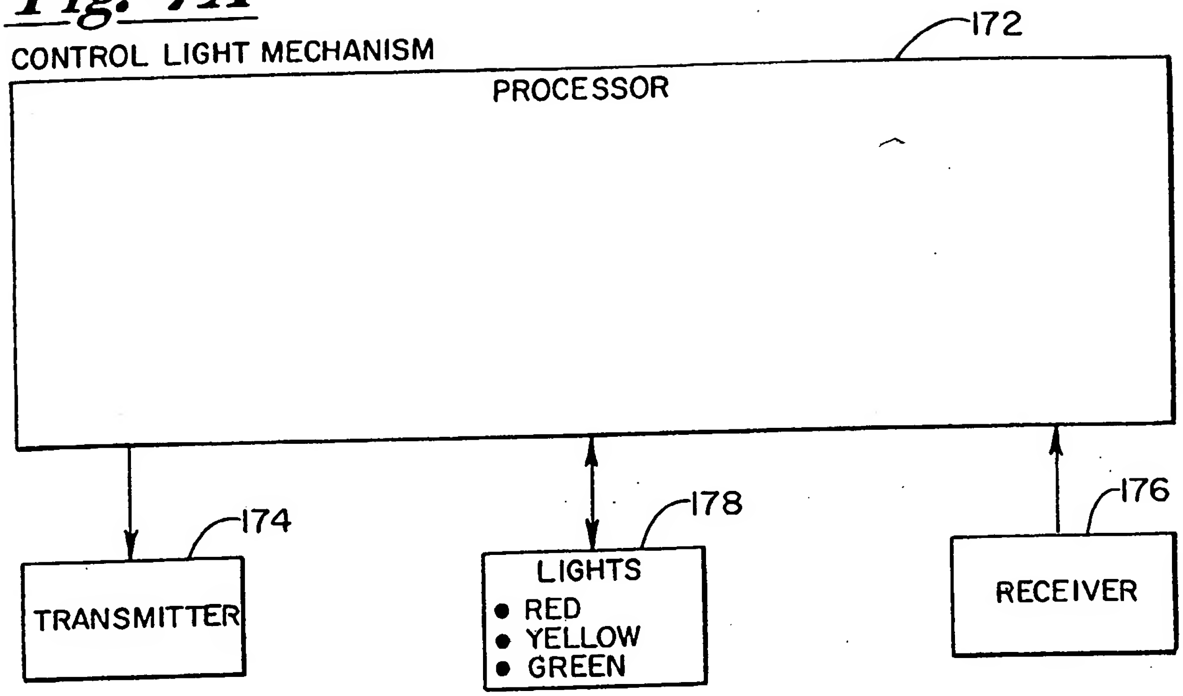

CONTROL LIGHT MECHANISM
172
PROCESSOR
174
TRANSMITTER
178
LIGHTS
• RED
• YELLOW
• GREEN
176
RECEIVER

Fig.-7B

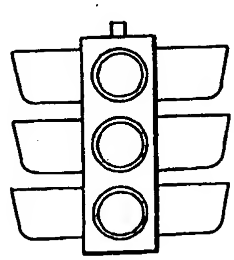


Fig.-8A

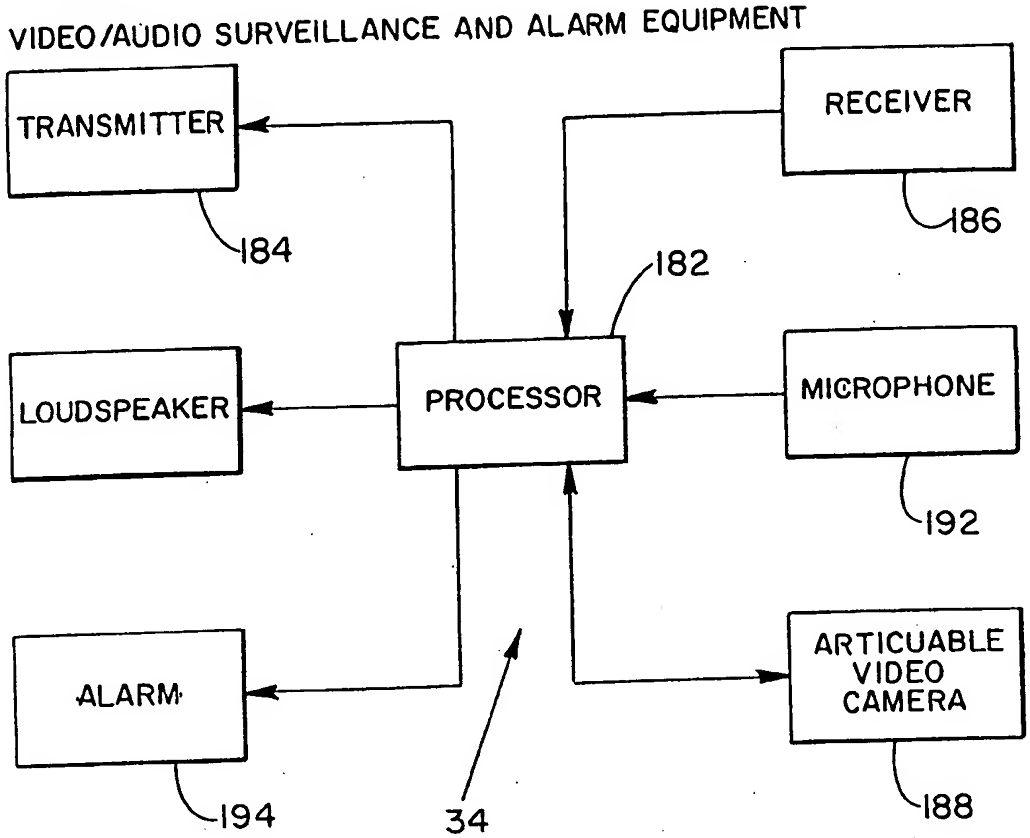

VIDEO/AUDIO SURVEILLANCE AND ALARM EQUIPMENT
TRANSMITTER
184
RECEIVER
186
182
LOUDSPEAKER
PROCESSOR
MICROPHONE
192
ALARM
ARTICUABLE VIDEO CAMERA
194
34
188

Fig.-8B

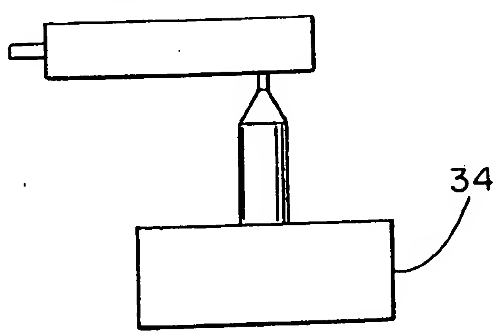

34

Fig.-9A

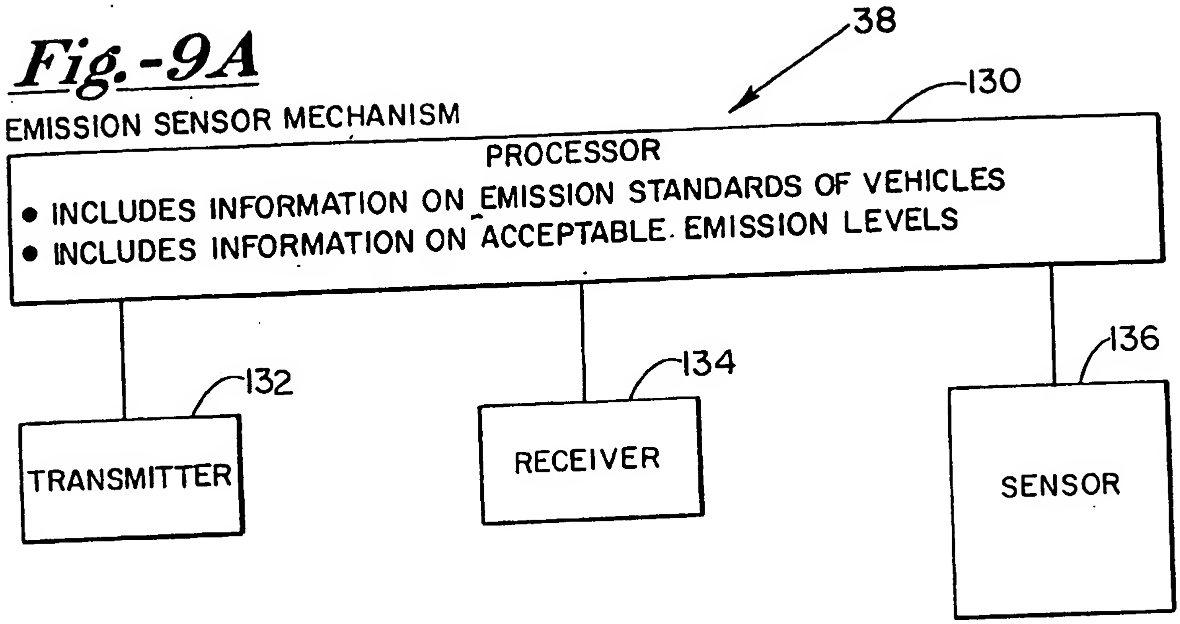

38
130
EMISSION SENSOR MECHANISM
PROCESSOR
• INCLUDES INFORMATION ON EMISSION STANDARDS OF VEHICLES
• INCLUDES INFORMATION ON ACCEPTABLE EMISSION LEVELS
132
TRANSMITTER
134
RECEIVER
136
SENSOR

Fig.-9B

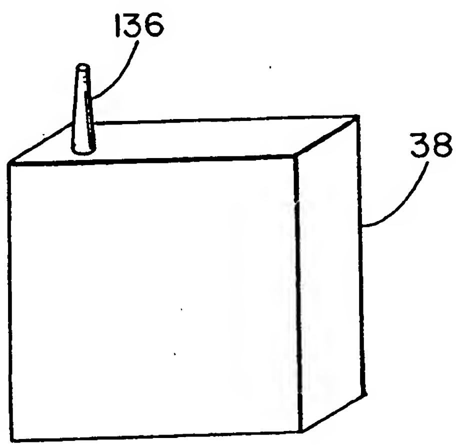

136
38

Fig.-10A

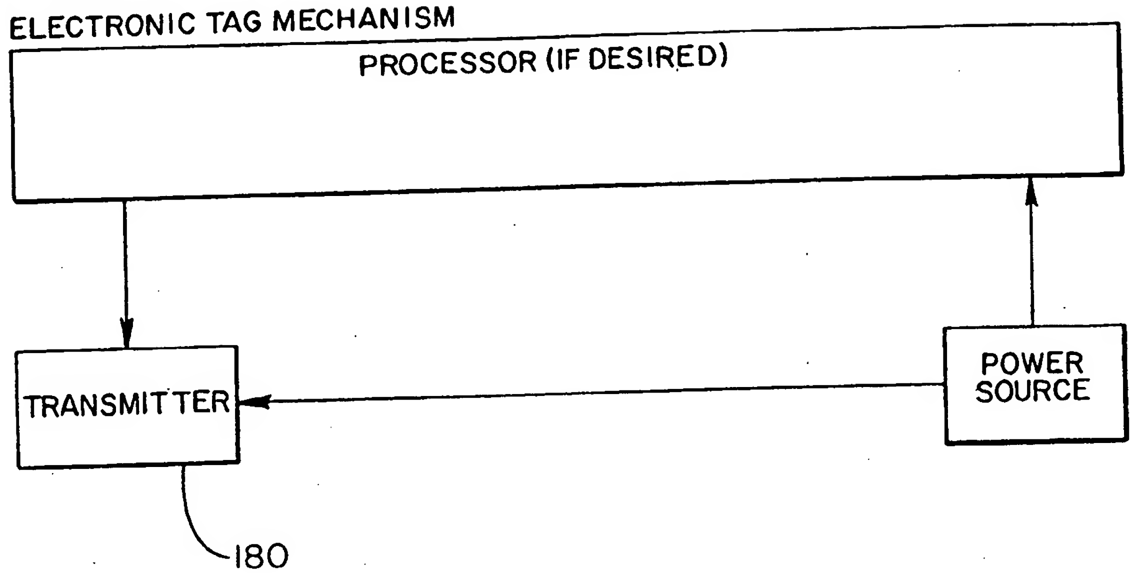


Fig.-10B

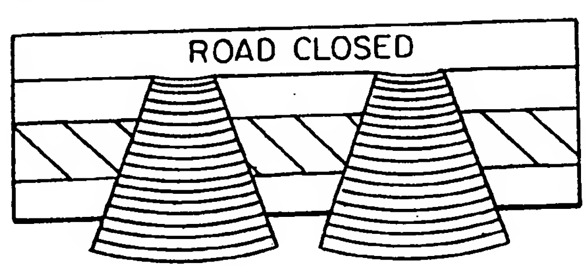


Fig.-11A

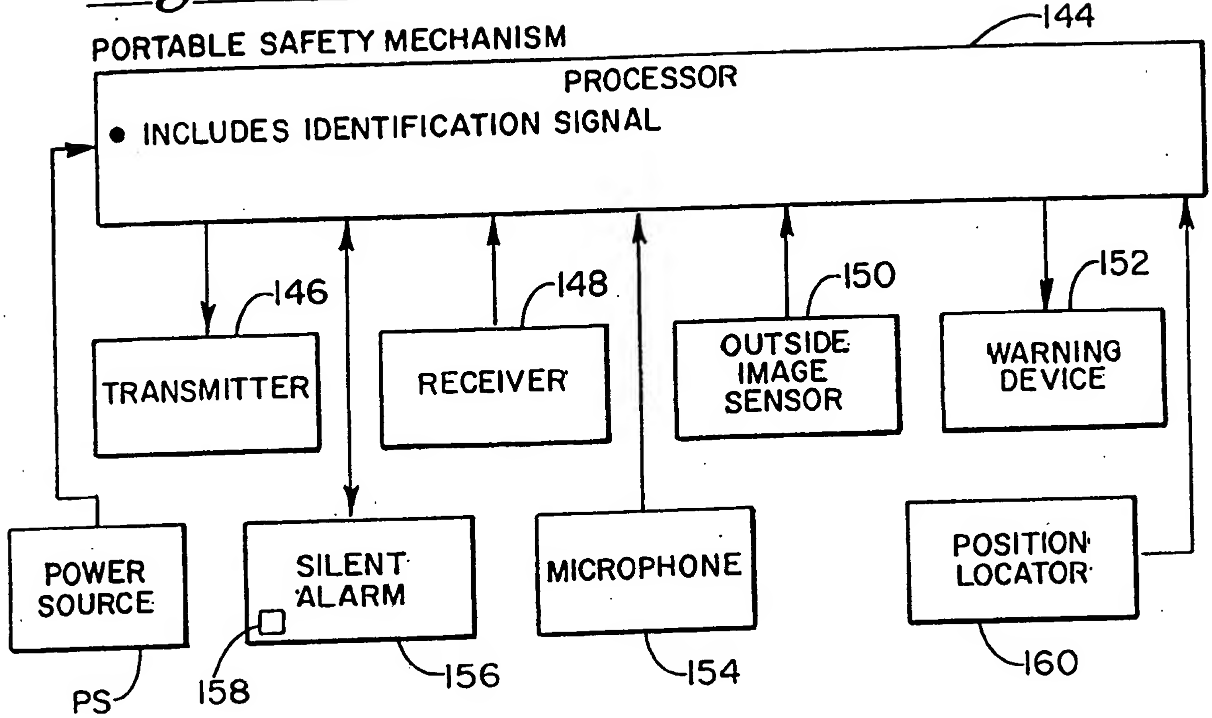


Fig.-11B

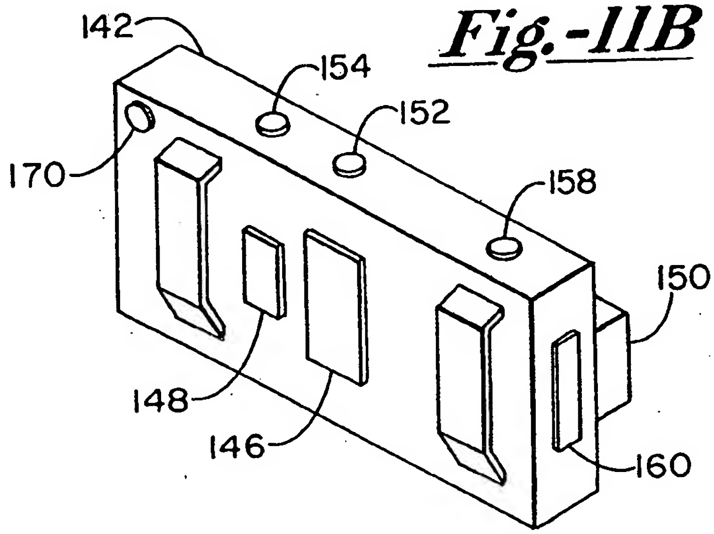


Fig.-12B

Fig.-12C

Fig.-12A

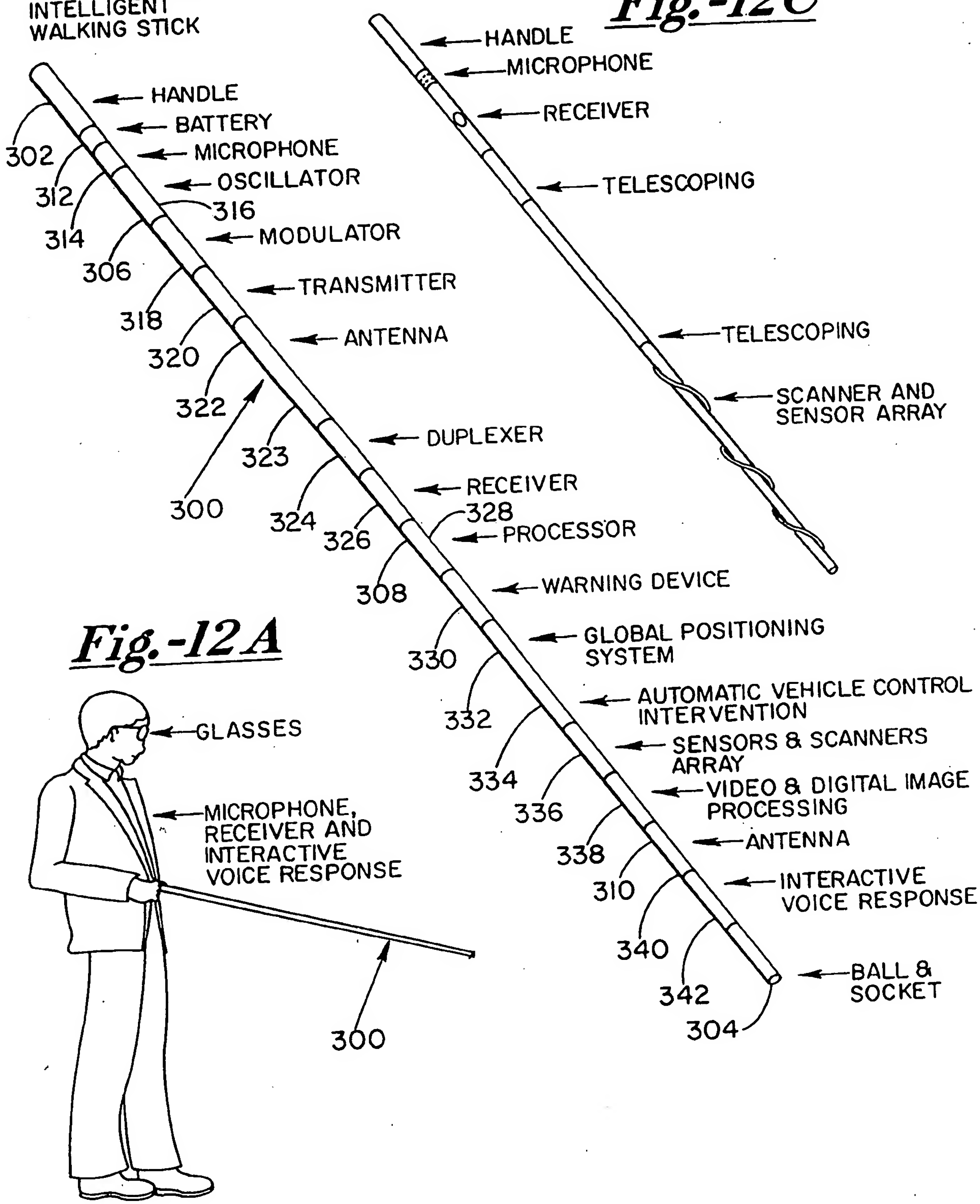


Fig.-13

COMMUNICATIONS

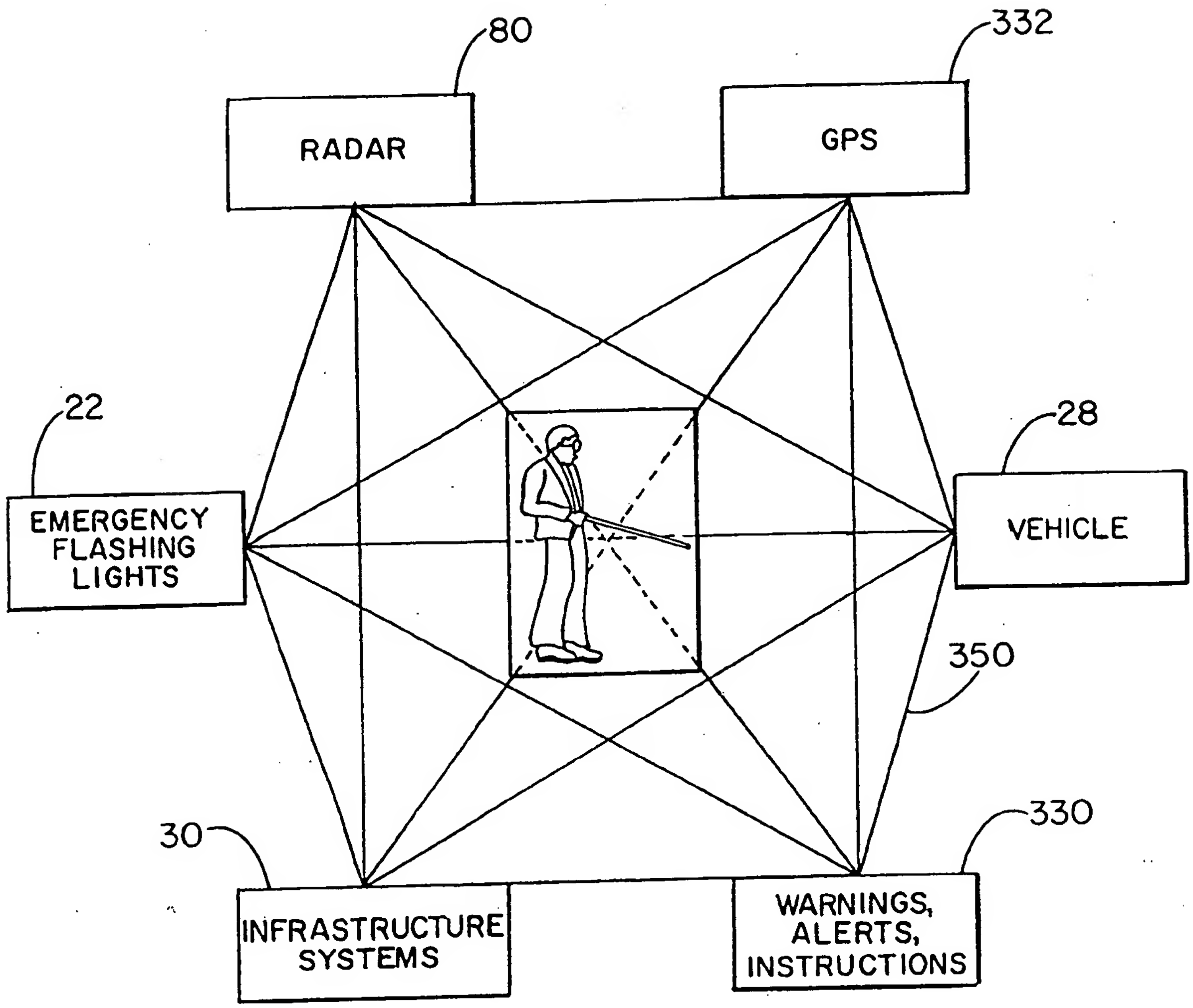


Fig.-14A

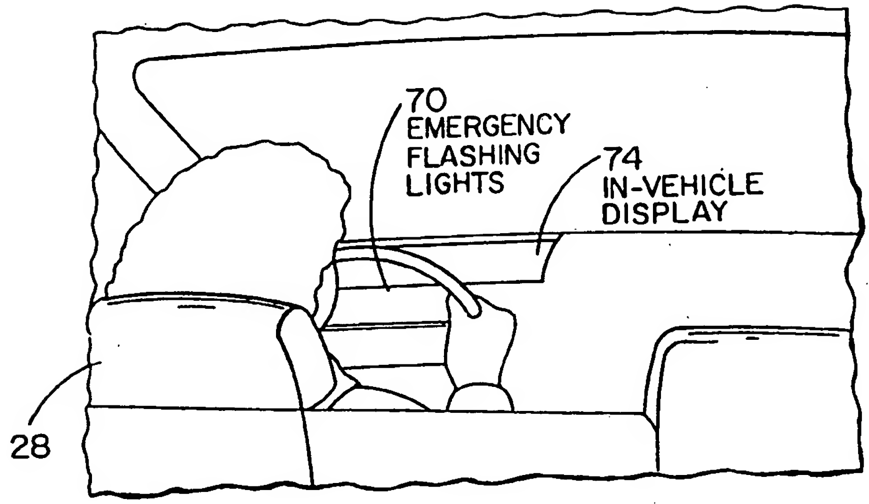


Fig.-14B

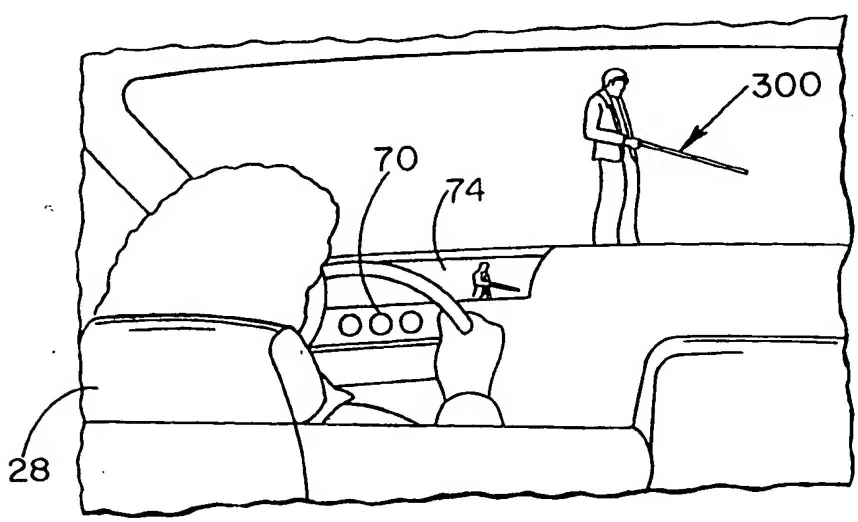


Fig.-15A

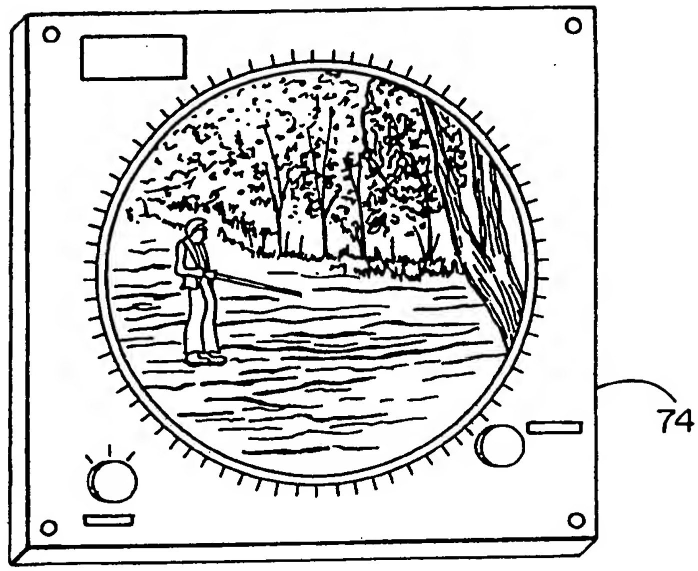


Fig.-15B

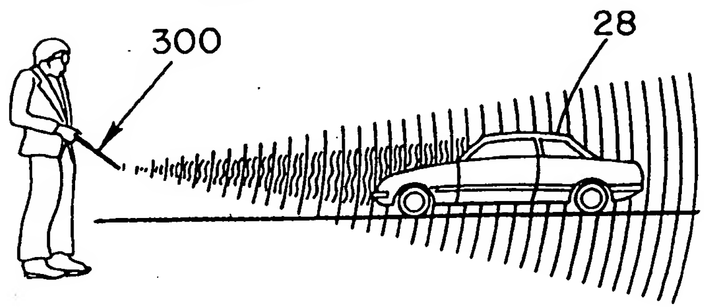


Fig.-16A

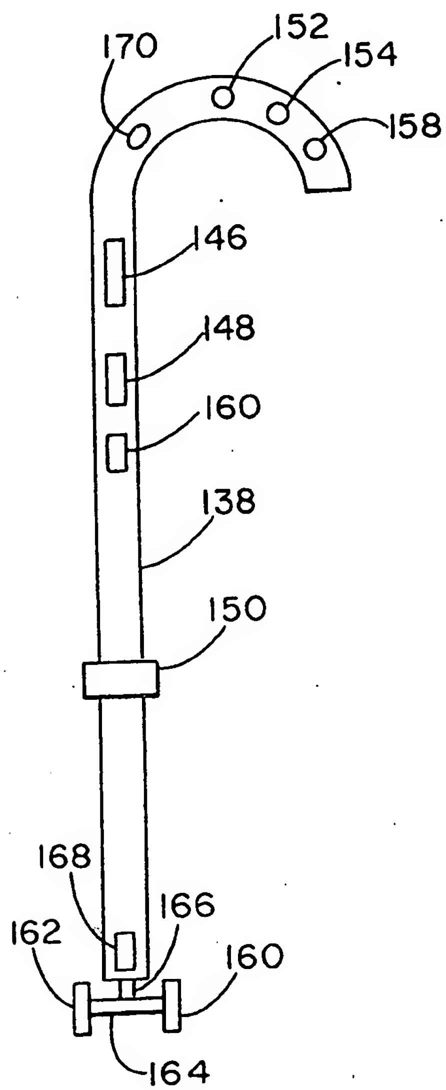


Fig.-16B

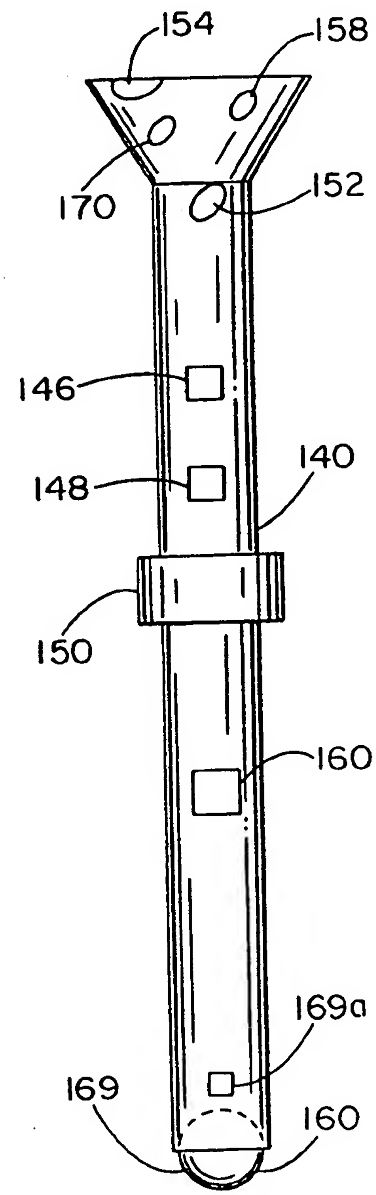


Fig.-17A

ANTISKID SYSTEM

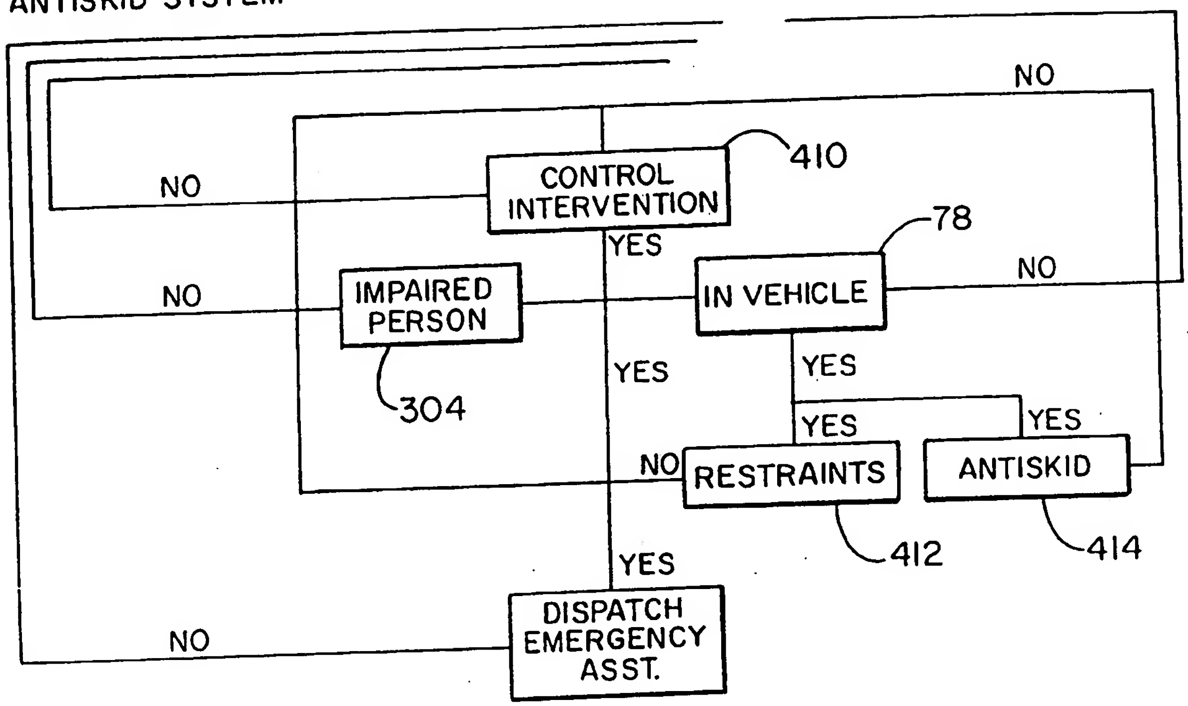


Fig.-17B

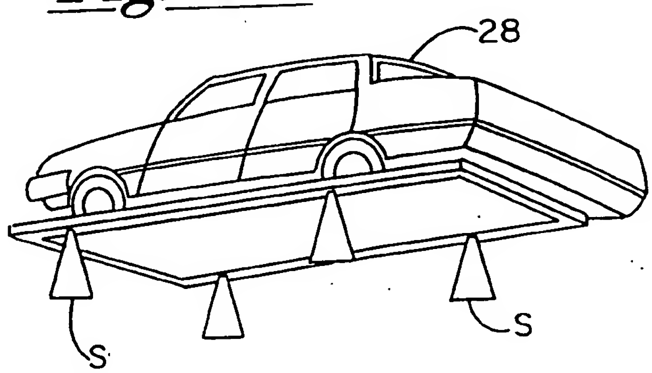
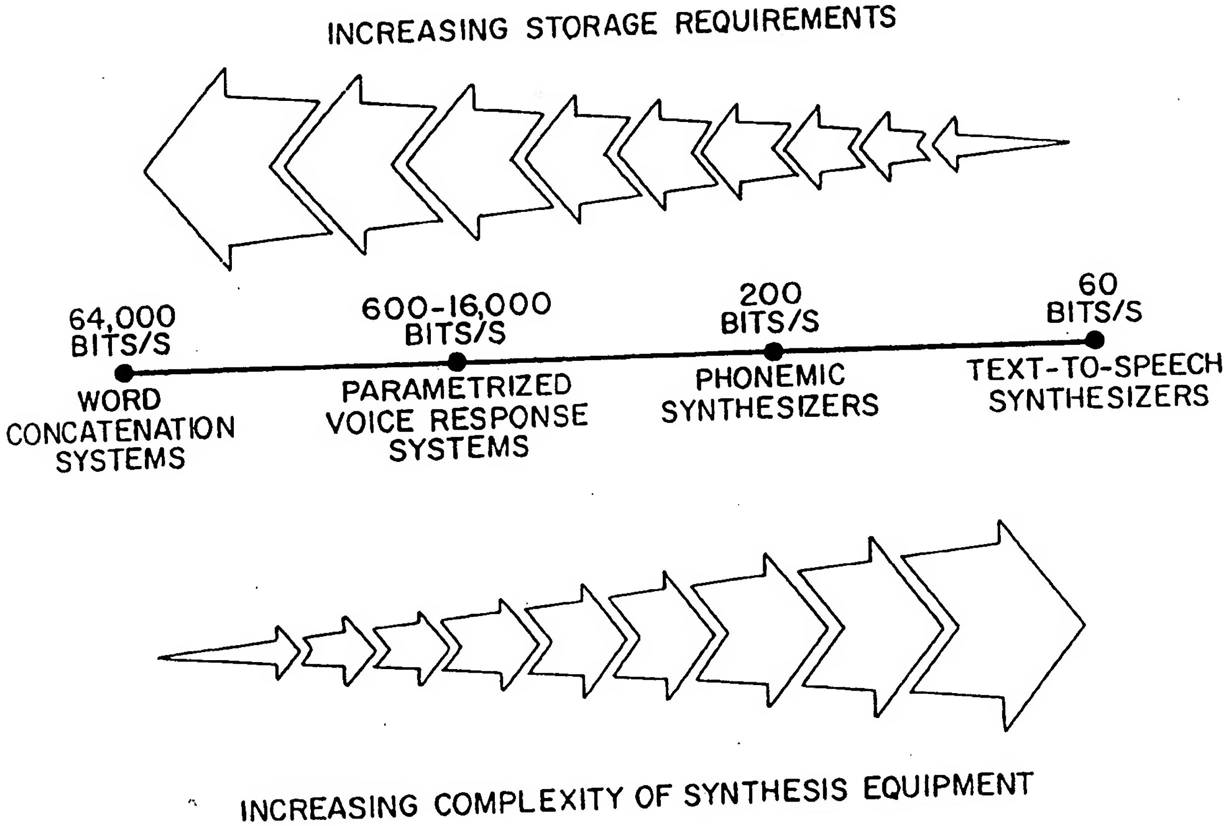


Fig.-18 (PRIOR ART)

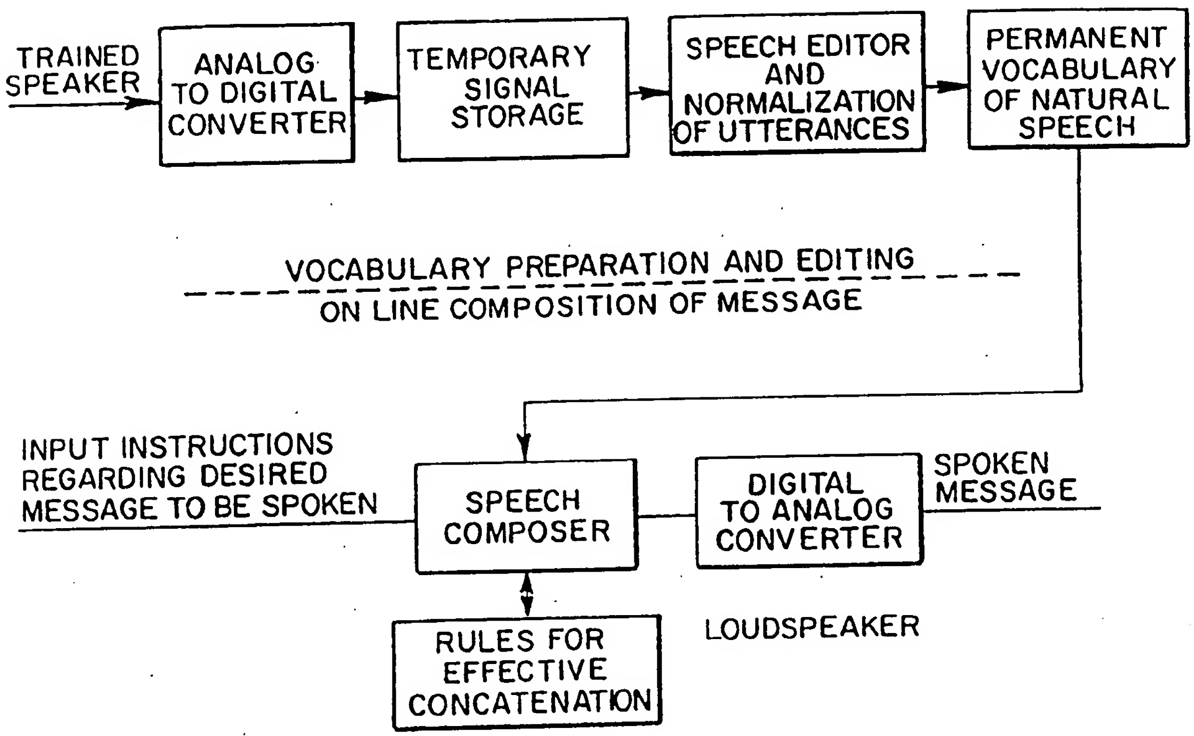
INTERACTIVE VOICE RESPONSE



SPECTRUM OF ALTERNATIVE TYPES OF VOICE RESPONSE SYSTEMS.

Fig.-19A (PRIOR ART)

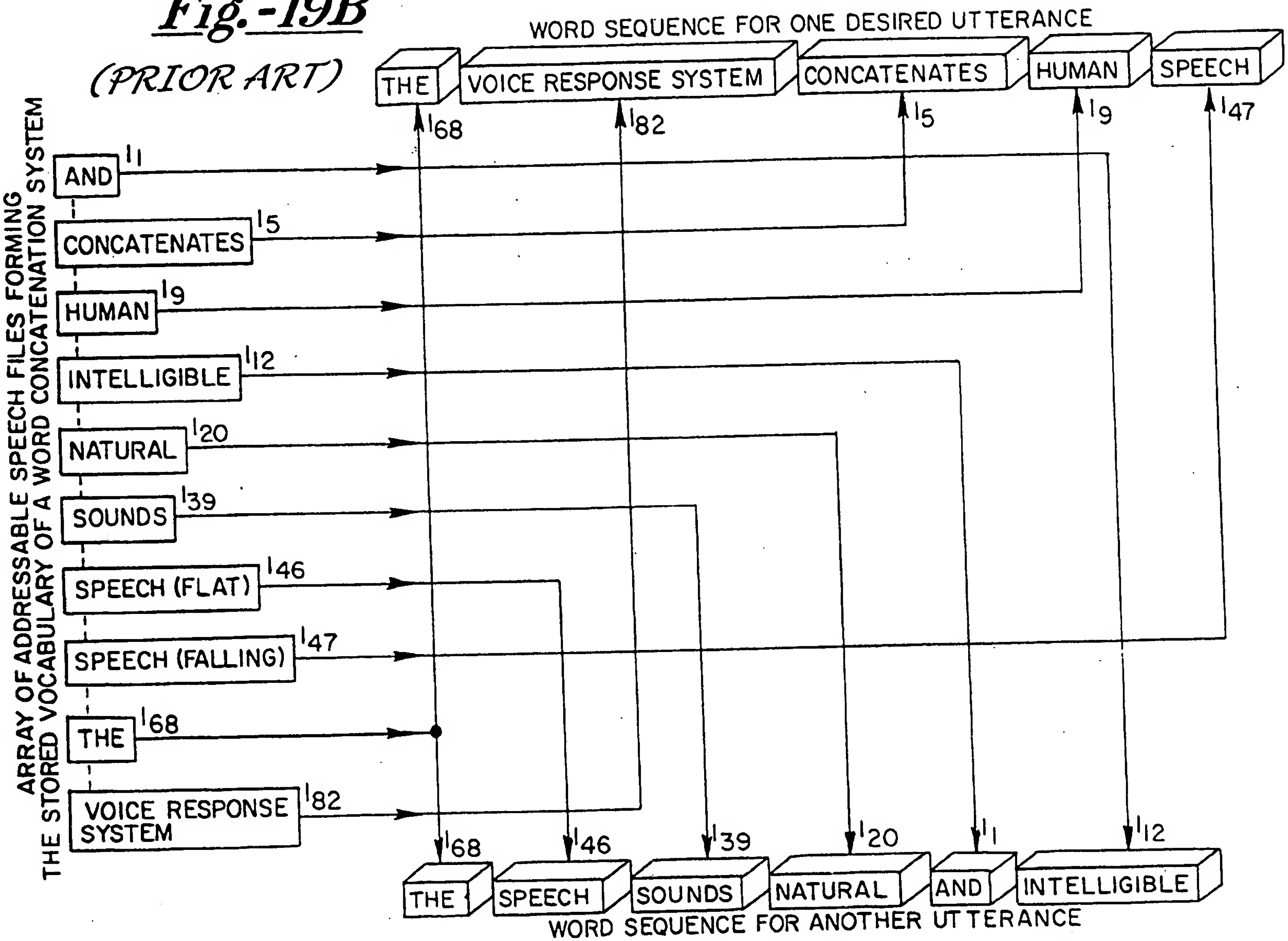
INTERACTIVE VOICE RESPONSE



VOICE RESPONSE SYSTEM WHICH IS BASED UPON CONCATENATION OF WORDS SPOKEN BY A HUMAN.

Fig.-19B

(PRIOR ART)



WAVEFORMS OF WORDS OR PHRASES FROM THE DICTIONARY ARE CONNECTED END TO END TO ACHIEVE CONNECTED VOICE OUTPUT FROM A WORD CONCATENATION SYSTEM.

(PRIOR ART)

Fig.-20A

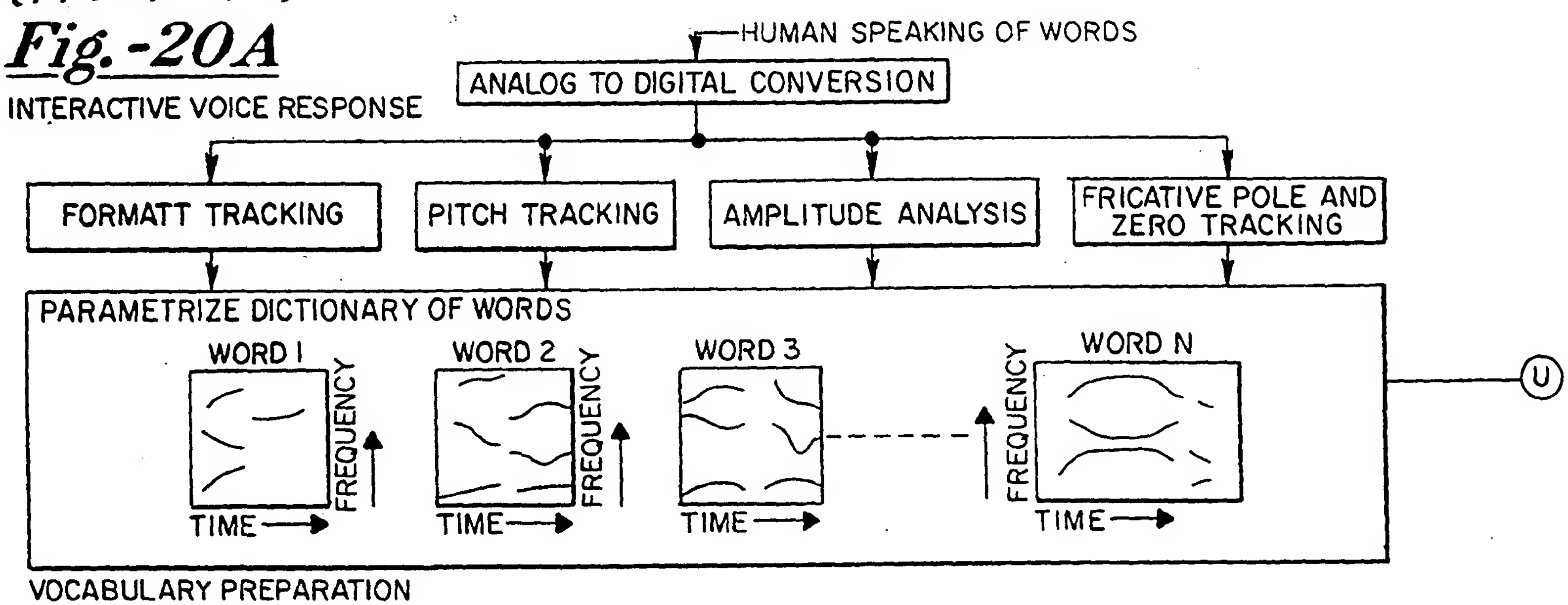


Fig.-20B (PRIOR ART)

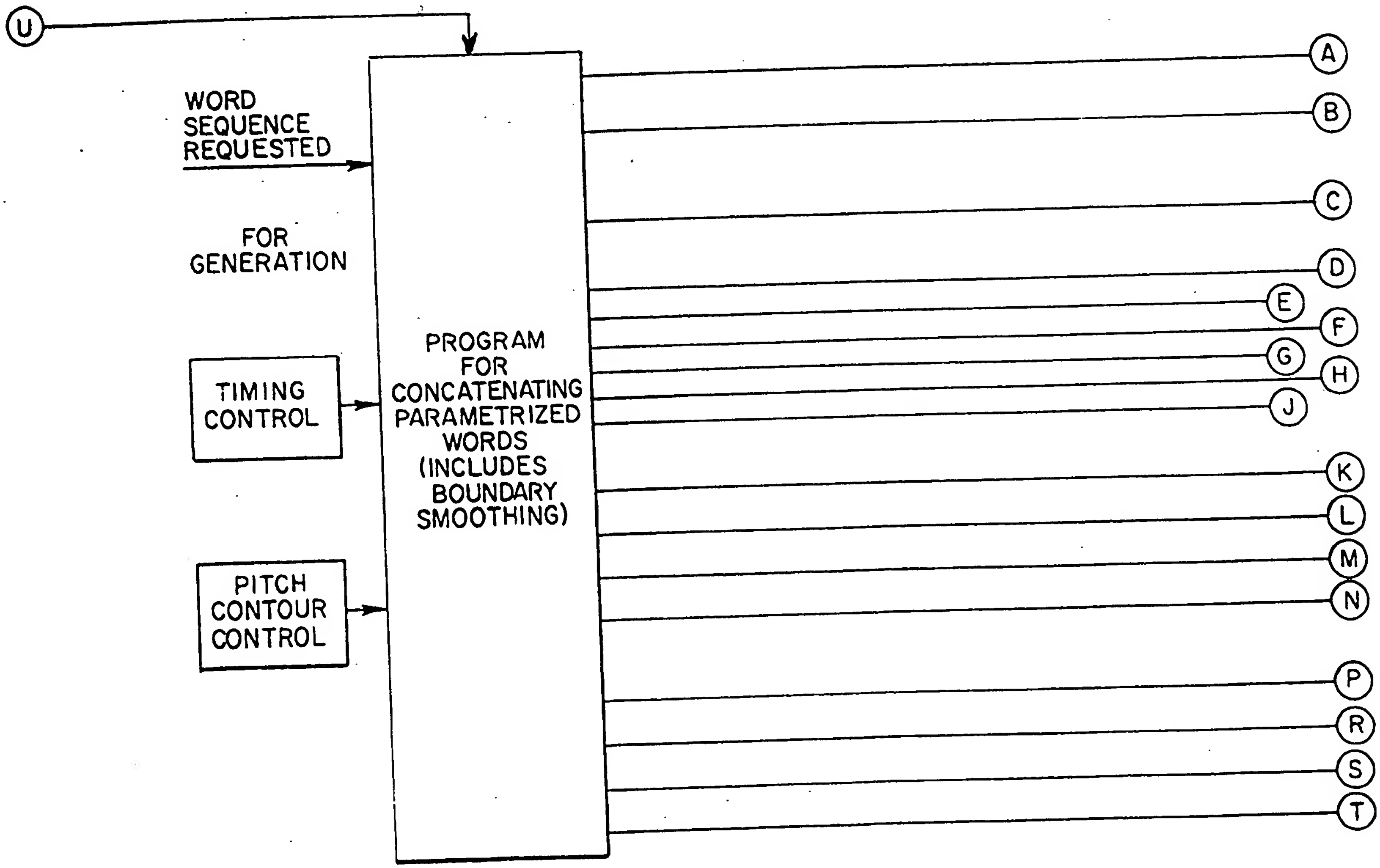


Fig.-20C (PRIOR ART)

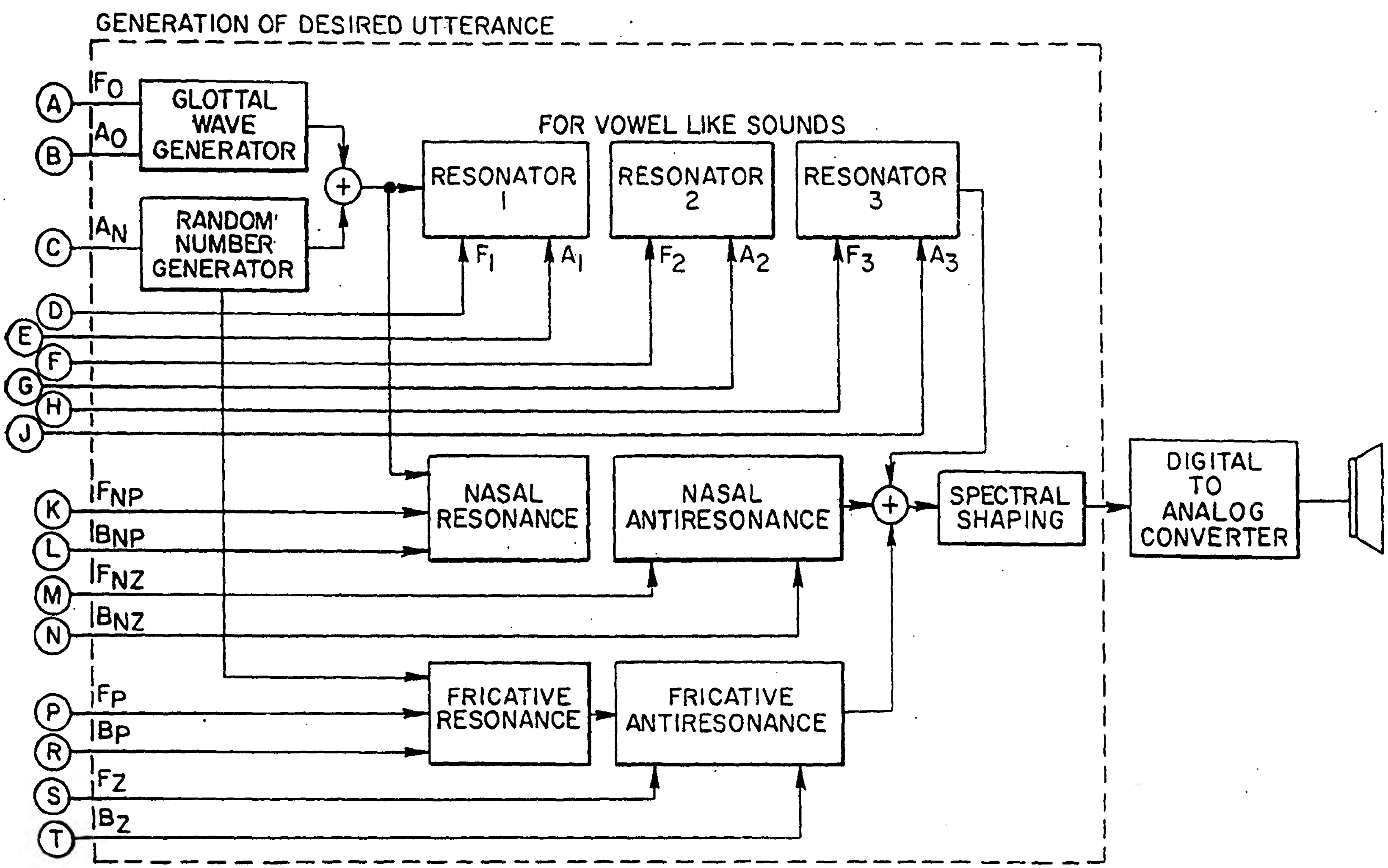
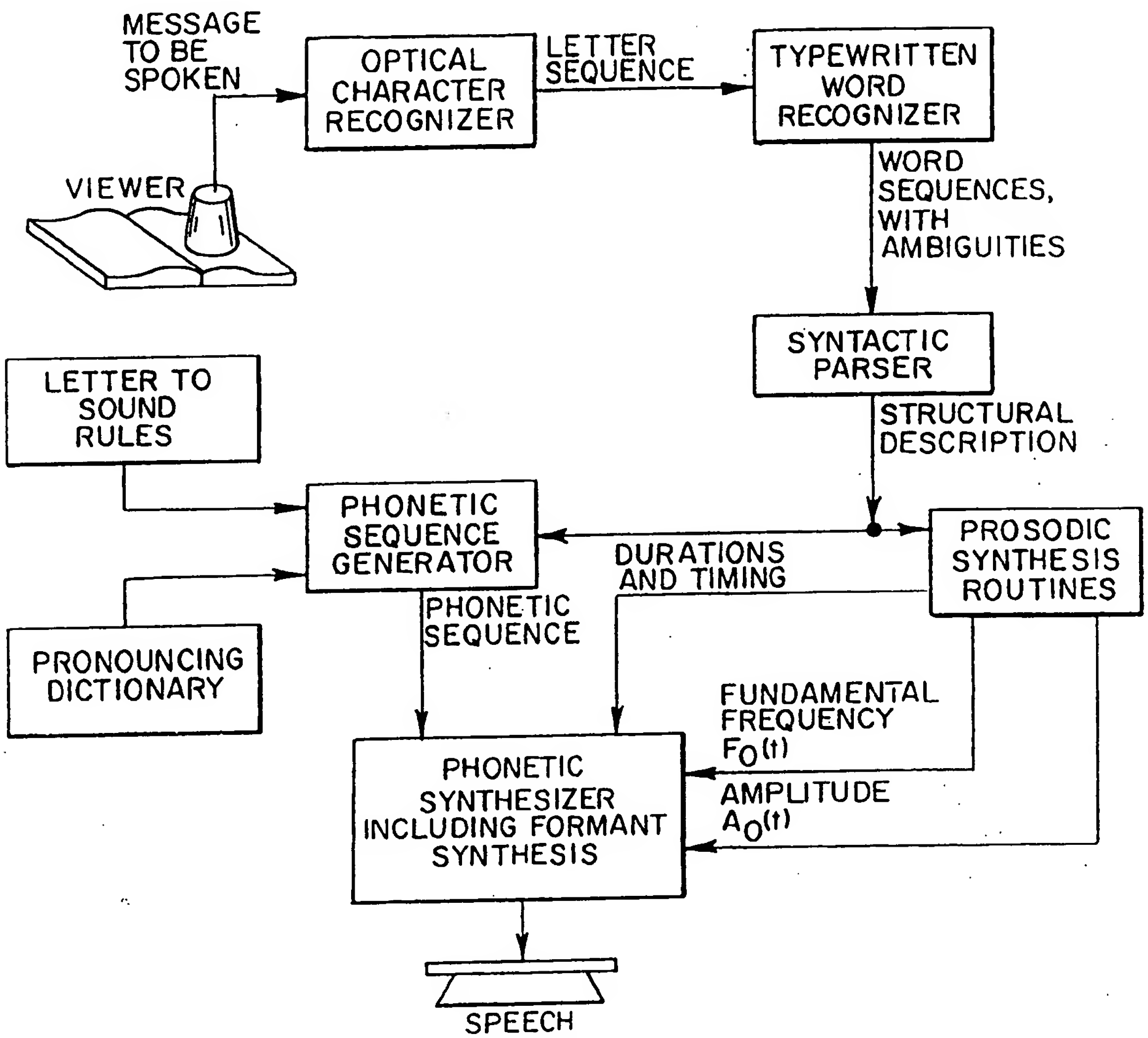


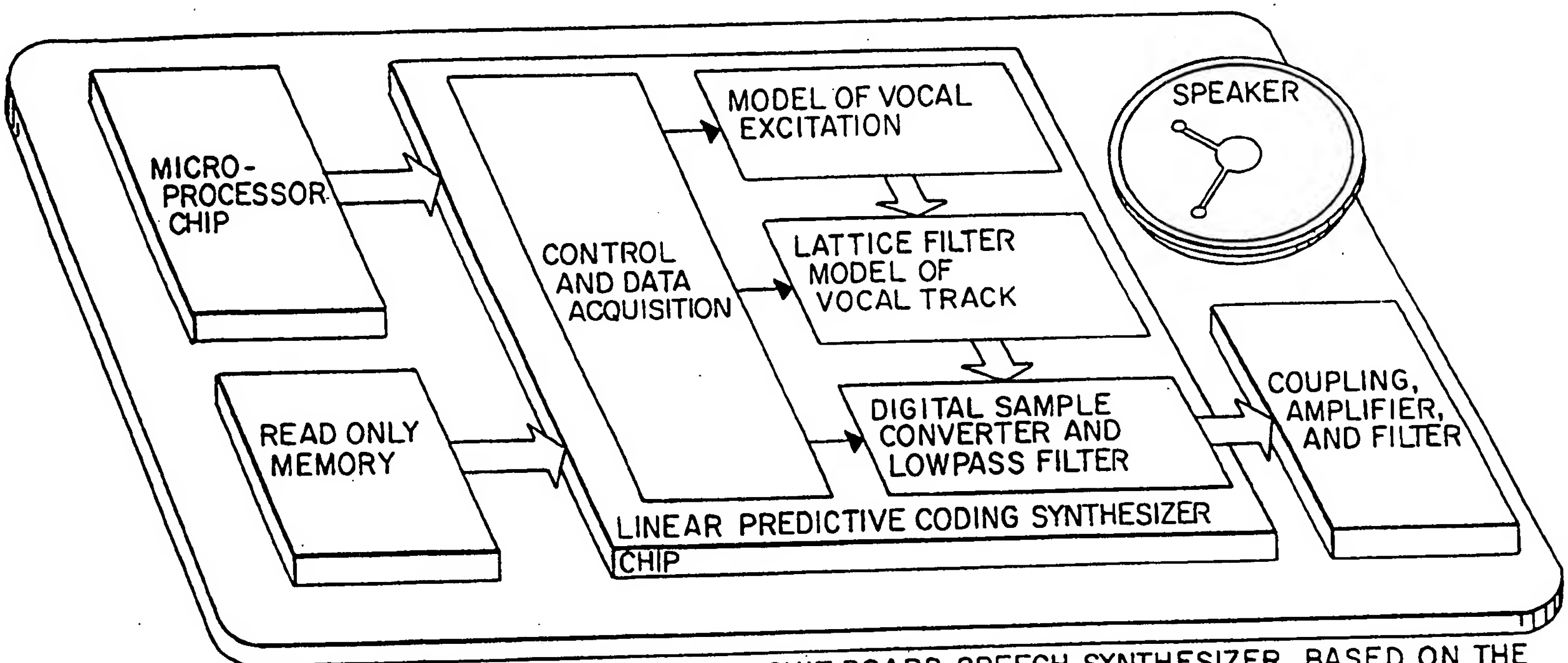
Fig.-21A (PRIOR ART)

INTERACTIVE VOICE RESPONSE



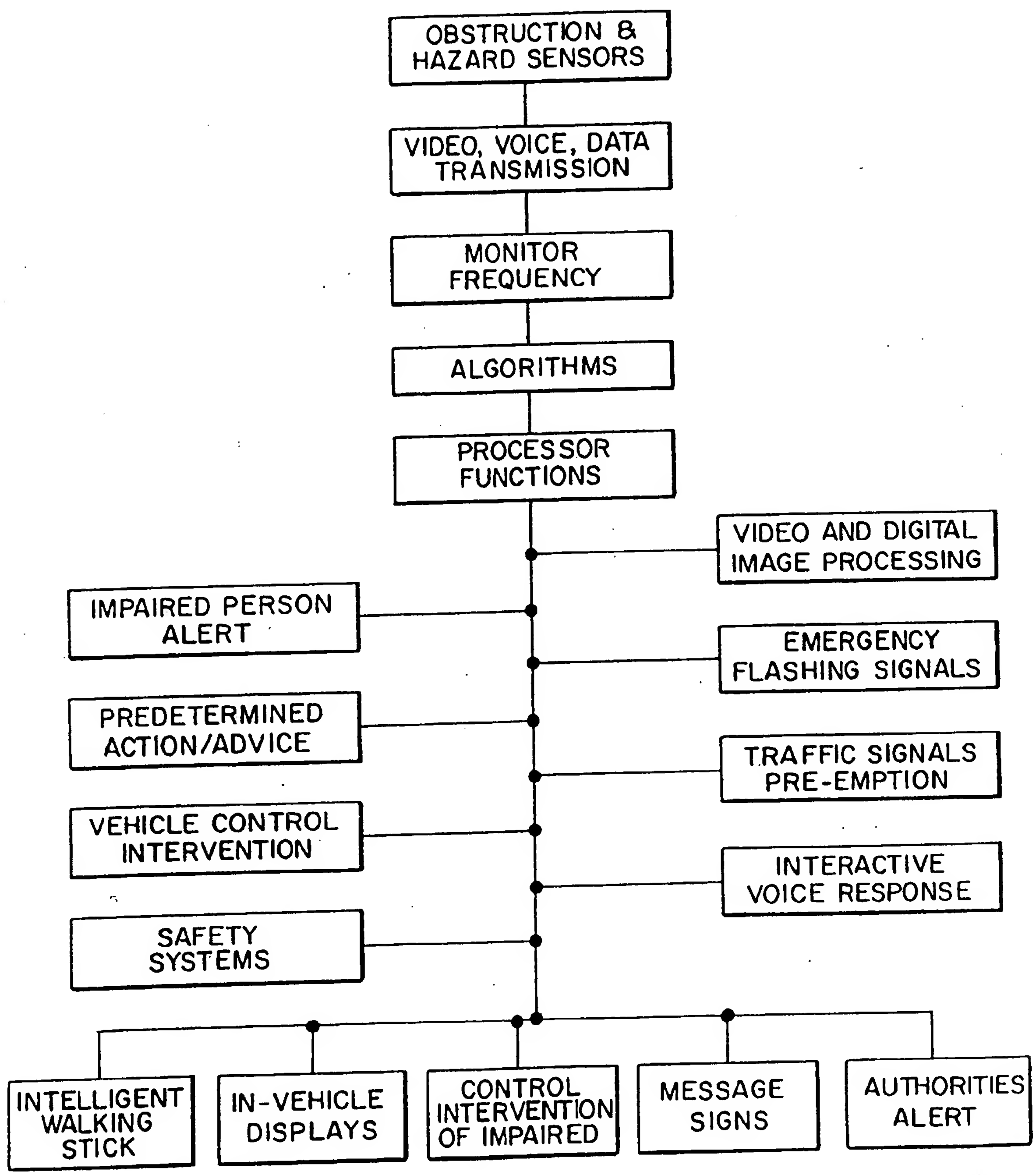
TEXT TO SPEECH SYSTEM FOR GENERATING COMPLEX SENTENCES WITH LARGE VOCABULARIES

Fig.-21B (PRIOR ART)



BASIC COMPONENTS OF A SINGLE CIRCUIT BOARD SPEECH SYNTHESIZER, BASED ON THE LINEAR PREDICTIVE CODING (LPC) METHOD FOR MODELING HUMAN VOCAL PRODUCTION PROCESSES.

Fig.-22



OBSTRUCTION & HAZARD SENSORS
VIDEO, VOICE, DATA TRANSMISSION
MONITOR FREQUENCY
ALGORITHMS
PROCESSOR FUNCTIONS
VIDEO AND DIGITAL IMAGE PROCESSING
IMPAIRED PERSON ALERT
EMERGENCY FLASHING SIGNALS
PREDETERMINED ACTION/ADVICE
TRAFFIC SIGNALS PRE-EMPTION
VEHICLE CONTROL INTERVENTION
INTERACTIVE VOICE RESPONSE
SAFETY SYSTEMS
INTELLIGENT WALKING STICK
IN-VEHICLE DISPLAYS
CONTROL INTERVENTION OF IMPAIRED
MESSAGE SIGNS
AUTHORITIES ALERT

Fig.-23

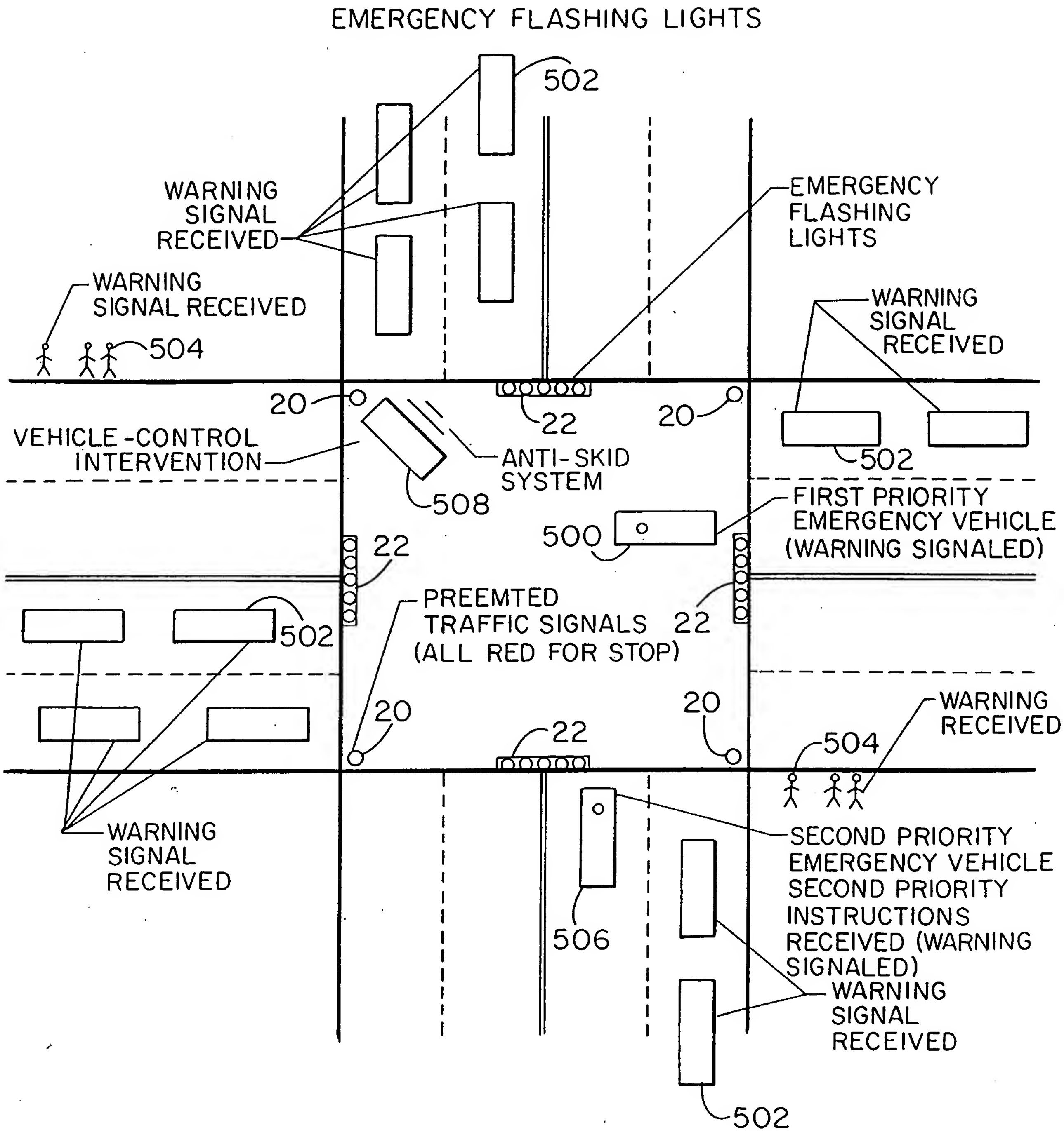
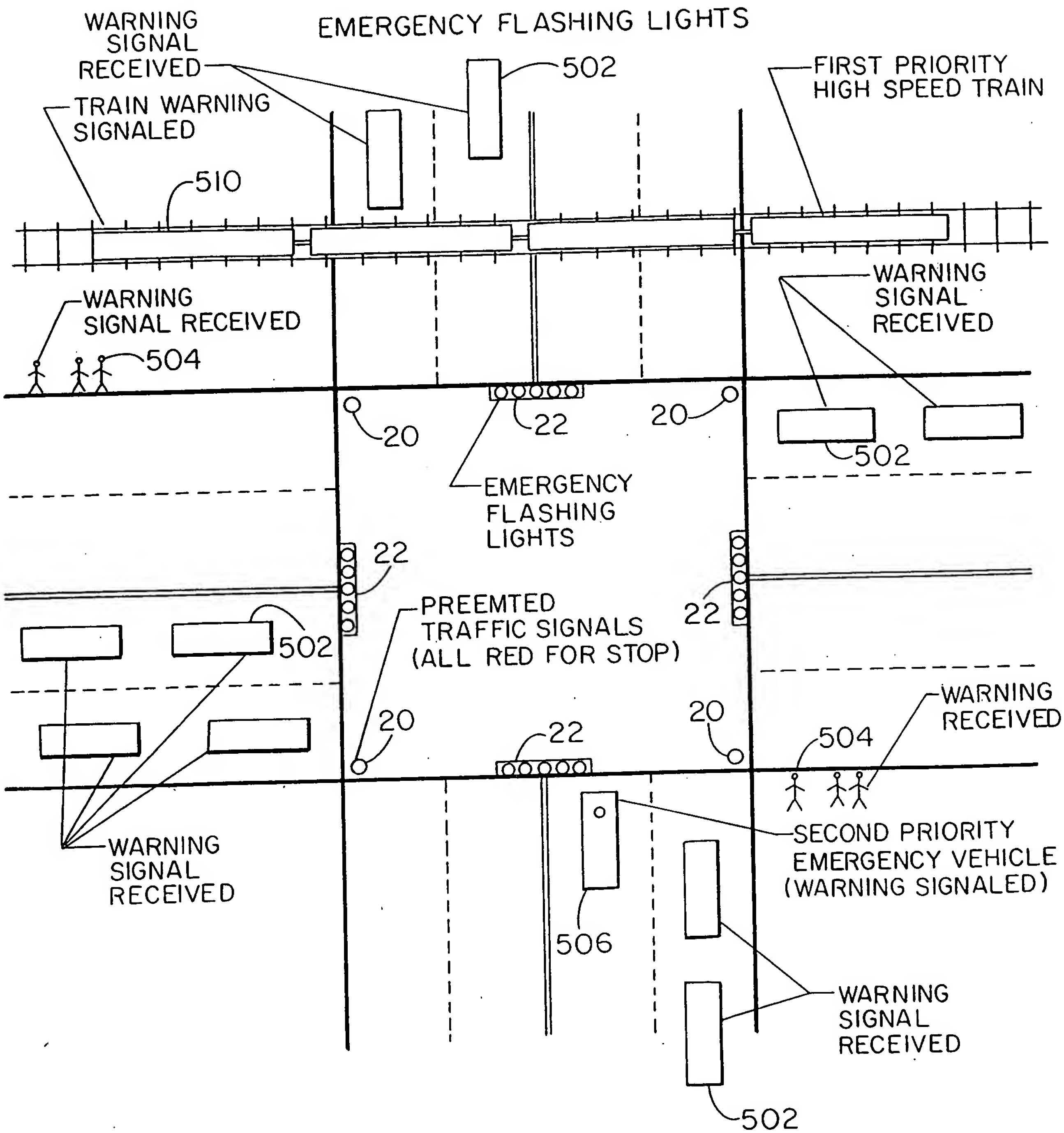

EMERGENCY FLASHING LIGHTS
502
WARNING SIGNAL RECEIVED
EMERGENCY FLASHING LIGHTS
WARNING SIGNAL RECEIVED
504
WARNING SIGNAL RECEIVED
20
22
20
VEHICLE-CONTROL INTERVENTION
ANTI-SKID SYSTEM
502
508
FIRST PRIORITY EMERGENCY VEHICLE (WARNING SIGNALED)
500
22
PREEMTED TRAFFIC SIGNALS (ALL RED FOR STOP)
22
502
20
20
22
504
WARNING RECEIVED
WARNING SIGNAL RECEIVED
SECOND PRIORITY EMERGENCY VEHICLE SECOND PRIORITY INSTRUCTIONS RECEIVED (WARNING SIGNALED)
506
WARNING SIGNAL RECEIVED
502

Fig.-24



WARNING
SIGNAL
RECEIVED
EMERGENCY FLASHING LIGHTS
502
FIRST PRIORITY
HIGH SPEED TRAIN
TRAIN WARNING
SIGNALED
510
WARNING
SIGNAL RECEIVED
504
WARNING
SIGNAL
RECEIVED
22
20
20
20
502
EMERGENCY
FLASHING
LIGHTS
22
PREEMTED
TRAFFIC SIGNALS
(ALL RED FOR STOP)
22
502
20
20
22
504
WARNING
RECEIVED
WARNING
SIGNAL
RECEIVED
SECOND PRIORITY
EMERGENCY VEHICLE
(WARNING SIGNALED)
506
WARNING
SIGNAL
RECEIVED
502

FIG. 25

RADAR & SENSOR-BASED SYSTEMS

Radar and Sensor-Based Systems for use in automated traffic control, collision avoidance, safety, and information systems, work in combination and comprise: microwave radar, millimeter-wave radar, laser radar (also known as LIDAR or light detection and ranging), ultrasound, video image processing, infrared imaging, infrared illumination, ultraviolet illumination, etc.. Radar systems utilize pulse, pulse doppler, frequency-modulated continuous-wave (FM-CS), binary phase modulation, and frequency modulation transmission modes. For example, an experimental continuous-wave radar which exploits the Doppler principle has been developed for use in automobiles. The radar can anticipate a crash when an obstacle is 30 feet away in order to deploy air-cushion-type passive restraints. It can sense obstacles 500 feet away to govern automatic braking and headway control. The source of carrier power is an X-band Gunn-type solid-state oscillator.

In Radar and Sensor-Based Systems, the processor is designed and programmed to receive real-time data (analog or digital) from transducers, sensors, and other data sources that monitor a physical process. The processor can also generate signals to elements that control the process. For example, a processor might receive data from a sensor, compare the data with a predetermined standard, and then produce a signal that preempts a set of traffic lights.

Radar sensors can be built into integrated circuit chips.

SIGNAL OUTPUT

OSCILLATOR
Generates the electric waves for the radar beam and sends the electric waves to the modulator.

MODULATOR
Sends the electric waves to the transmitter, telling the transmitter when to send radar waves to the antenna and when to shut off.

TRANSMITTER
Amplifies the low-powered waves from the oscillator into high-powered electromagnetic waves.

DUPLEXER
Routes the radar waves from the transmitter to the antenna.

ANTENNA
Receives signals from the transmitter and broadcasts them.

SIGNAL INPUT

ANTENNA
After the transmitter shuts down, the antenna receives the radar echoes reflected from the target.

DUPLEXER
Routes reflected radar waves to the receiver.

RECEIVER
Amplifies the weak reflected signals picked up by the antenna and sends them to the signal processor (computer). It also filters out background noise picked up by the antenna.

PROCESSOR
Screens out echoes from large fixed objects, like trees and mountains, and sends only the desired signals to the display.

RADAR

FIG. 26

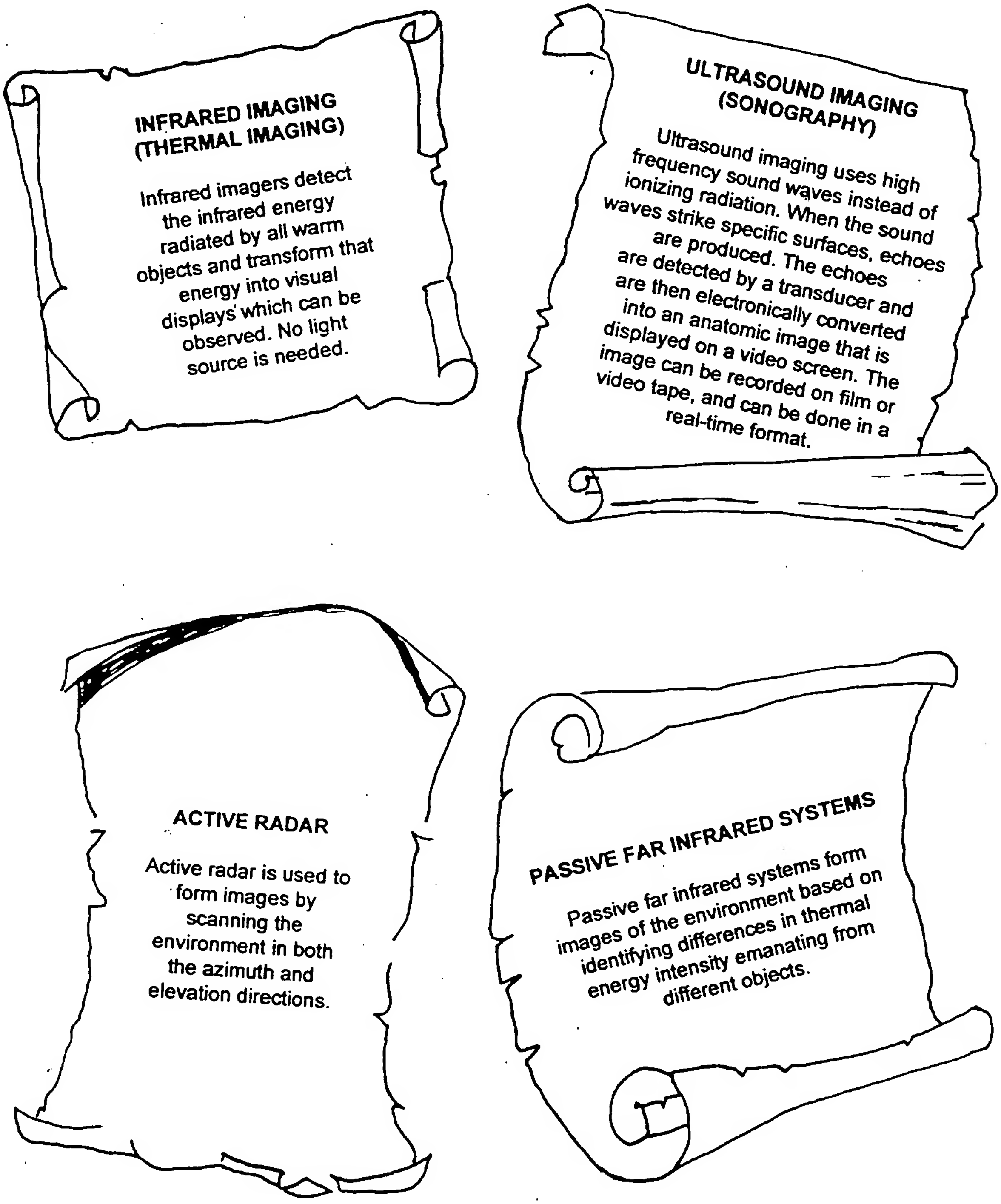

INFRARED IMAGING (THERMAL IMAGING)
Infrared imagers detect the infrared energy radiated by all warm objects and transform that energy into visual displays which can be observed. No light source is needed.
ULTRASOUND IMAGING (SONOGRAPHY)
Ultrasound imaging uses high frequency sound waves instead of ionizing radiation. When the sound waves strike specific surfaces, echoes are produced. The echoes are detected by a transducer and are then electronically converted into an anatomic image that is displayed on a video screen. The image can be recorded on film or video tape, and can be done in a real-time format.
ACTIVE RADAR
Active radar is used to form images by scanning the environment in both the azimuth and elevation directions.
PASSIVE FAR INFRARED SYSTEMS
Passive far infrared systems form images of the environment based on identifying differences in thermal energy intensity emanating from different objects.

FIG. 27

RADAR

LASER RADAR

Laser radar is used to form images by scanning the environment in both the azimuth and elevation directions. A continuous-wave laser radar system can determine both range and the rate at which the range is changing. An advantage of this system is its extreme precision.

PASSIVE MILLIMETER - WAVE SYSTEM

Passive millimeter-wave systems construct images based on an object's natural emissions at millimeter-wave frequencies, independent of light conditions.

CHARGED-COUPLED-DEVICE CAMERA

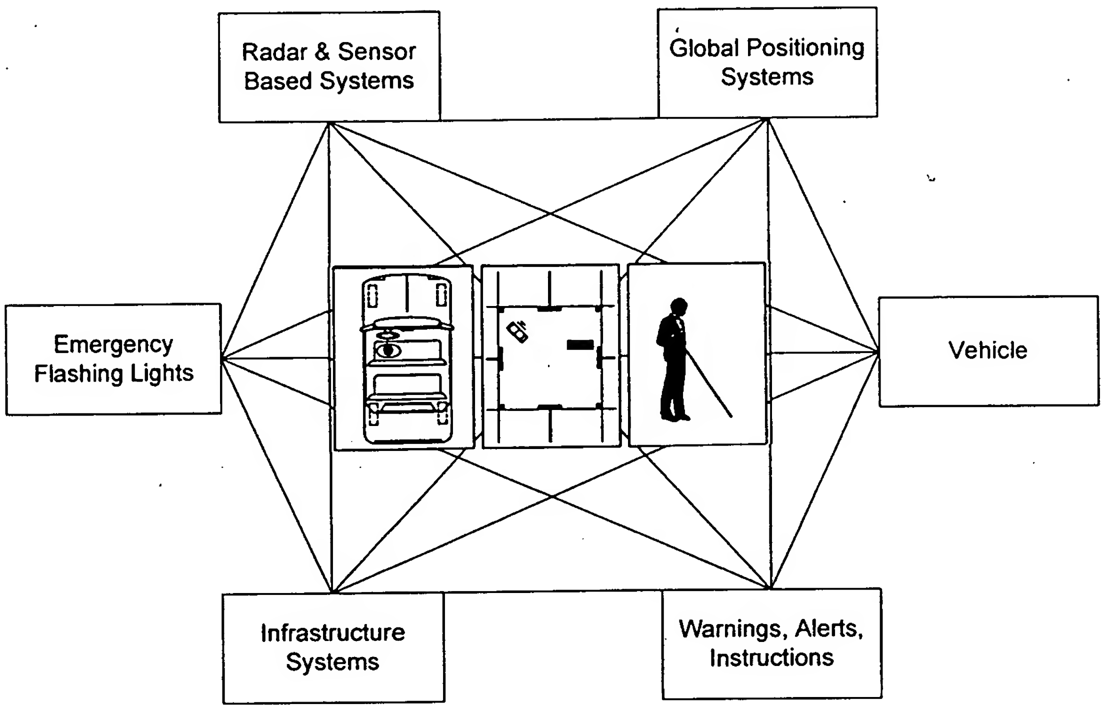
In charge-coupled-device imagers, the photo-sites are used to convert an optical image into an electrical signal. These photo generated electrons can be collected in a regular spaced array of photo-sites, each of which will then contain a charge packet of electrons. The amount of charge collected at each photo-site will be directly proportional to the incident radiation of that photo-site. If an image is focused on the surface of the device, the amounts of charge collected in the photo-sites will then be a faithful representation of the intensity of the image at each location. These charge packets correspond to picture elements, or pixels, each of which is a small part of the complete image. The number of photo-sites on the device determines the resolution of the final image.

Regular charge-coupled-device cameras are employed for visual enhancement when an external light source is used to extend their visibility band.

Automated contact from more that on search radar with common fields of view will convert and combine sensed and imaged scen s into integrated, dynamic, visual and audibl displays, providing sight and information.

FIG. 28

NAVIGATION AND COMMUNICATIONS



Navigation technologies include: satellite, terrestrial, and dead reckoning. Satellite options include the Global Positioning System (GPS) and satellite communication systems that provide geo-location services. Terrestrial systems include marine navigation such as Loran-C, dead-reckoning systems employing gyros, compasses and differential odometers. A combination of technologies may be required.

Communication technologies include: voice or data linked through geo-synchronous orbit (GEO) and low earth orbit (LEO) satellite, terrestrial (mobile or fixed) voice and data systems in the 220-, 450-, 800-, and 900- MHz band, and citizens band (CB) radio.

FIG. 29 WARNINGS - ALERTS - INSTRUCTIONS

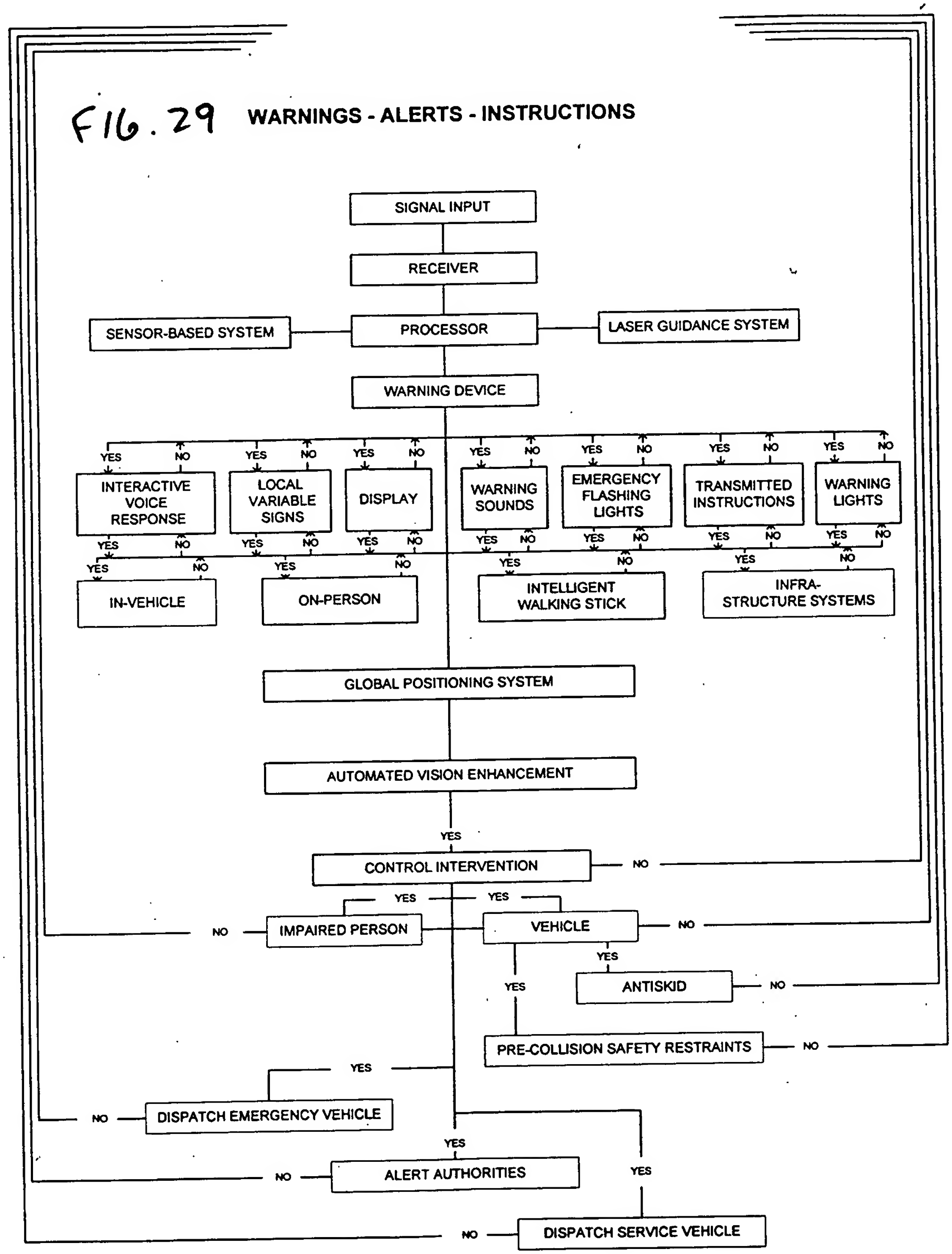


FIG. 30

RADAR, SENSOR BASED AND LASER GUIDANCE SYSTEMS